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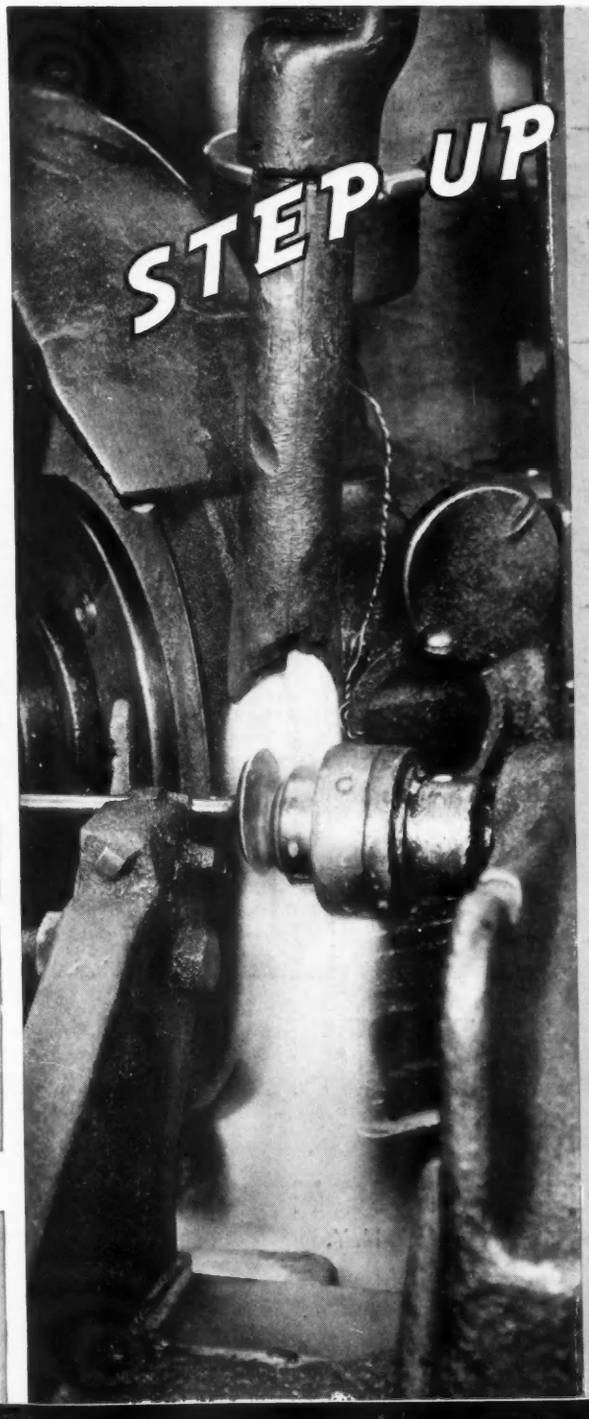
AUG 20 1938

AUTOMOTIVE INDUSTRIES

LAND — AIR — WATER

AUGUST 20, 1938



MACHINE TOOL OUTPUT

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Increased production with lowered operating costs can only be attained by increasing the production per unit of equipment.

Close limits of size, rapid removal of metal, long runs per tool grind and smooth operation of machines are largely dependent on the cutting lubricant.

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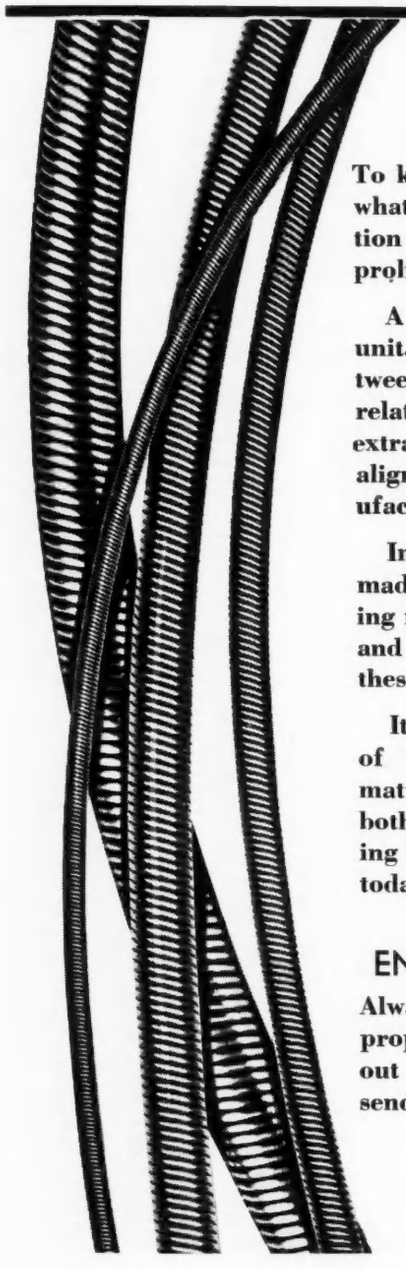
To *Know* FLEXIBLE SHAFTING is to *Use* it . . .



To know flexible shafting is to appreciate what a simple, effective, economical solution it is to power drive and remote control problems.

A single self-contained, easily applied unit, flexible shafting bridges the gap between any two points, regardless of their relative positions. Its use often eliminates extra parts and avoids the need for accurate alignment of parts, thereby reducing manufacturing and assembly costs.

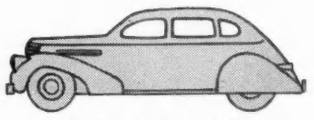
Important developments have been made in flexible shafting and the increasing number of applications in automobiles and aircraft shows that many engineers in these fields know about them.

It will pay you to bring your knowledge of flexible shafting up-to-date. Printed matter giving the latest information about both power drive and remote control shafting is yours for the asking. Write for it—today.

ENGINEERING COOPERATION

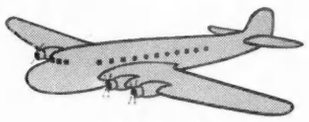
Always available to help you select the proper shaft for a specific use and work out its application—No obligation—Just send us essential data.

ACTUAL APPLICATIONS
S. S. WHITE FLEXIBLE SHAFTS



AUTOMOTIVE

Radio Tuning Controls
Radio Antenna Control
Clock Hand Setting
Trip Mileage Resetting
Crank Case Drain Plug (opening and closing)
Carburetor Choke and Needle Valve Control
Automatic Carburetor Control
Retractable Headlights
Speedometer Drive
Taximeter Drive
Truck Recorder Drive
Spot Light Control
Oil Filters
Windshield Wipers
Truck-Rail Freight Handling Device
Service Car Crane Drive
Engine Governor Control
Gear Shift Control
Headlight Tester



AIRCRAFT

Radio Receiver Controls
Radio Transmitter Controls
Beacon Receiver Controls
Radio Compass Loop Control
Antenna Loop Control
Antenna Reel Control
Variable Pitch Propeller Control
Tachometer Drive
Fuel Pump Drive
Windshield Wipers
Gyro Pilot Controls
Tab Controls
Heating Register Control
Others in process of development

S. S. WHITE

The S. S. White Dental Mfg. Co.
INDUSTRIAL DIVISION
Department A, 10 East 40th St., New York, N. Y.

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

Reg. U. S. Pat. Off.
Published Weekly

Volume 79 Number 8

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(*Advertisement*)

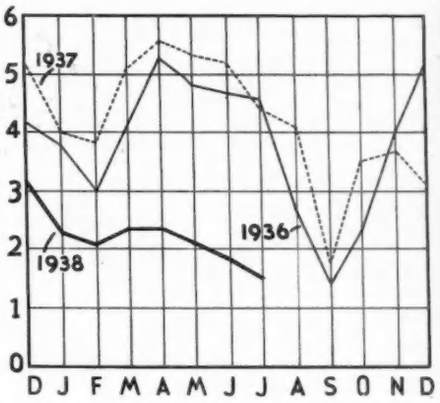
AUTOMOTIVE PRODUCTION*

Passenger Cars and Trucks —U.S. and Canada

Bar charts at the right represent total production to July 31st of year indicated.

Numbers at left of monthly graph below show production in 100,000's.

★From Department of Commerce Report and Automobile Manufacturers' Ass'n.



Ideas in Zinc

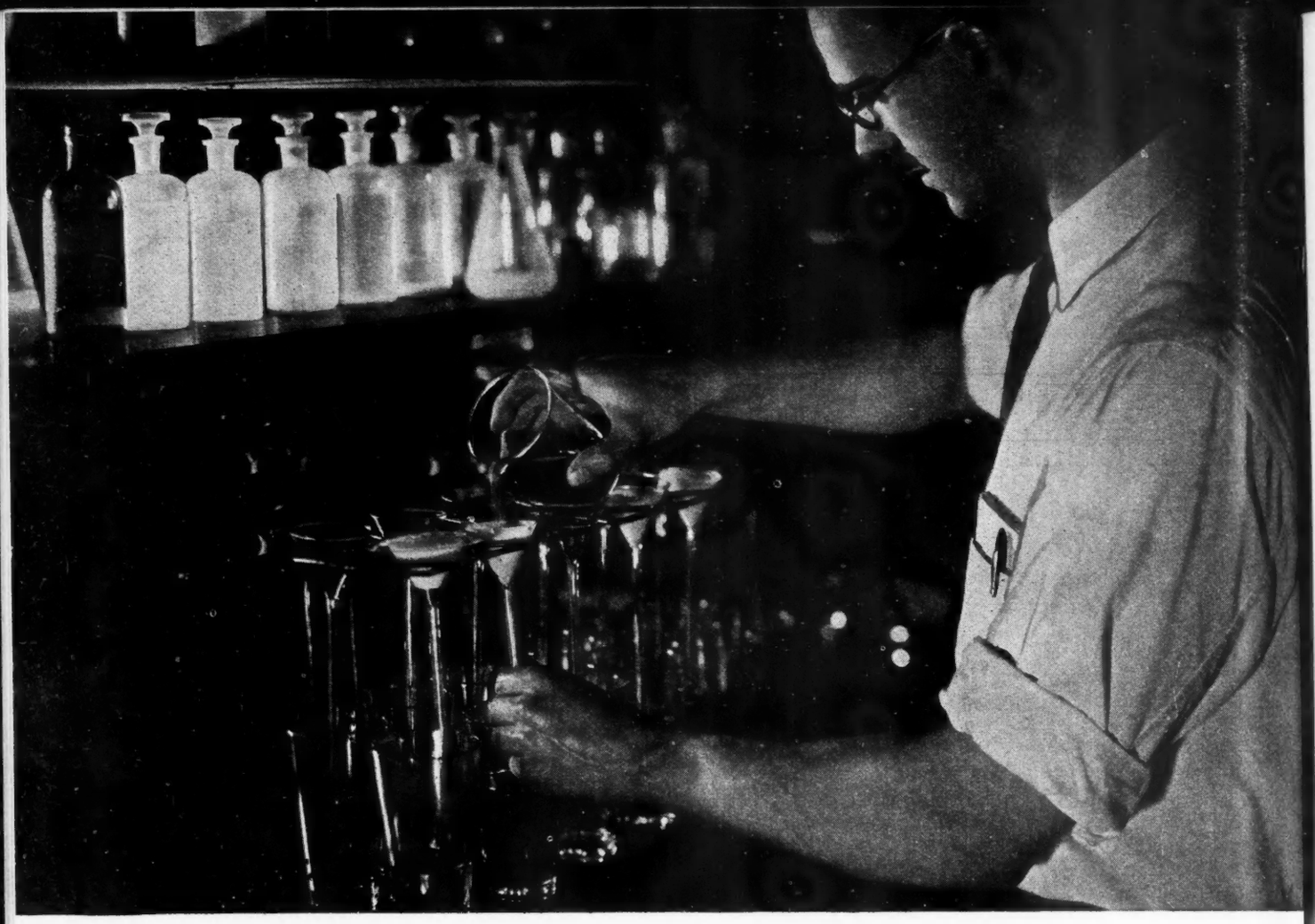
Die castings are invariably thought of in terms of mass production, especially in the automotive industry. But there are many fields, including those closely related to the automotive family, in which the economies and advantages of the process are being realized even though production quantities are considerably less.

Take, for example, the fast growing tractor industry. Many of the production problems in this field are similar to those in passenger car manufacturing and, regardless of comparatively low production, the same cures can apply. We find that one of the most progressive manufacturers in the tractor industry—the Allis-Chalmers Manufacturing Company—has taken its cue from the automobile world and adopted zinc alloy die castings for several important details.

One of the new applications is the rocker arm support for the overhead valve mechanism, and the other is an unique oil filter base die casting. The latter is relatively small, but is intricately cored and serves as the base for the novel oil filter and embodies the oil pressure gauge as well. This adoption of zinc alloy die castings marks a milestone in tractor production practice.

Designers of all heavy duty equipment can profit by this experience. The economies and physical advantages of zinc alloy die castings can be applied to many low production parts through the availability of the high strength, stable Zamak Alloys, based on Horse Head Special ZINC of 99.99+ per cent purity. The New Jersey Zinc Company, 160 Front Street, New York, N. Y.

Idea No. 16



Inland Research Scores Again

Ledloy—Another Metallurgical Achievement that Is Saving Money for Steel Users

Again, the pioneering of Inland metallurgical research has, in effect, put money into steel users' pockets.

The recently announced development of INLAND LEDLOY has enabled metal working plants to speed up their machining operations 30% to 60%. In terms of dollars, savings like the following examples are typical:

In the making of a case carburized worm shaft, $47.85 machining cost is being saved per ton of steel used.

The manufacturer of a socket ball control joint is saving $37.91 per ton by using Inland Ledloy 1120 instead of ordinary SAE 1120.

Finding ways of making better steel for each customer's purpose is the basis for Inland personal service. The occasional development of a new kind of steel, such as Inland Ledloy or Inland Hi-Steel (high tensile), merely emphasizes the extensive modern laboratory facilities which Inland makes daily available to all steel users.

Often but a small change in the surface characteristics of a steel sheet, or special control over its physical properties, makes a big difference in the costs and results of a forming operation; or the suggestions of an Inland engineer may help to save time and material in the use of structural steel.

More companies today than ever before are utilizing these special services to supplement their own technical staffs. We believe you would find this a worth-while practice to follow.

INLAND STEEL CO.

38 South Dearborn Street, CHICAGO • District Offices: DETROIT • KANSAS CITY • MILWAUKEE • ST. LOUIS • ST. PAUL

SHEETS STRIP TIN PLATE BARS PLATES FLOOR PLATES STRUCTURALS PILING RAILS TRACK ACCESSORIES REINFORCING BARS

Published Weekly
Founded 1895

AUTOMOTIVE INDUSTRIES

Vol. 79, No. 8
August 20, 1938

WILLIAM A. BLEES

. . . appointed as general sales manager for the Nash division of Nash-Kelvinator Corp. Mr. Blees has been closely associated with sales, service and management for over 20 years. In 1924 he joined General Motors Corp., later becoming vice-president in charge of sales of General Motors Buick-Oldsmobile-Pontiac set-up.

Mr. Blees goes to Nash from the advertising agency of Geyer, Cornell & Newell, Inc., where he held the post of vice-president and general manager. He is credited with having pioneered many of the sales and finance plans now standard practice in the automobile industry.

Production

Accelerated Pace of '39 Assemblies Expected Next Week

With Ford reopening for a period of 1938 V-8 production this week, the outlook for passenger car assemblies at this writing is stronger than it has been since the middle of last month. Chevrolet is closing strong, winding up production of '38 models this week, while Ford is expected to continue right into September.

Passenger car production for the week ending Aug. 20 is estimated at 26,200 units, total including Ford, Chevrolet, Hudson and miscellaneous. Nash and Studebaker are reported to have wound up '38 production.

This week marks a quickening of activity on many assembly lines, in preparation for delivery of '39 models to dealers all over the country. First week of a new model year is always a period of tenseness and anxiety for production executives what with the initial production try-out of equipment and tools groomed for the big push during the preceding six months or more. This year is no exception due to the major changes that have had to be made in final assembly line set-up and procedure.

So far as we can learn, the actual number of '39 assemblies to be completed this week will be rather small due to the problems of changeover as well as the customary delays in the delivery of the first group of bodies produced on new tooling. However, this week's experience should set the stage for an accelerated pace next week.—J. G.

Machine Tool Index

A further rise in machine tool orders occurred during July, according to the report of the National Machine Tool Builders' Association. The total index moved to 89.6, an increase over June of 28 per cent.

Both domestic and foreign orders participated in the increase. The domestic index at 41.8 is 17 per cent over June, and the foreign index at 47.8 increased 38 per cent.

Ryan Contract

The Ryan Aeronautical Co., San Diego, recently was awarded a $100,000 contract for 500 stainless steel exhaust collector ring assemblies to be used on the Wright Cyclone engines which the British government ordered to power 200 Lockheed bombers now under construction. The order was said to be one of the largest of its kind ever placed in this country.

AUTOMOTIVE INDUSTRIES

Summary of Automotive Production Activity
(Week Ending Aug. 20)

BUSES Operations at present averaging 50 to 60 per cent of capacity. No indication of immediate change in operating rates or early prospects.

TRUCKS Fall prospects continue bright with some sizeable deliveries recently made and in the offing. Strengthening in sales appears to be uniform throughout the country. One of the largest producers to announce three new models shortly.

TRACTORS Little change in tempo of current operations. Possibility of labor difficulties continues to cause uncertainty as to plant operation for one large manufacturer.

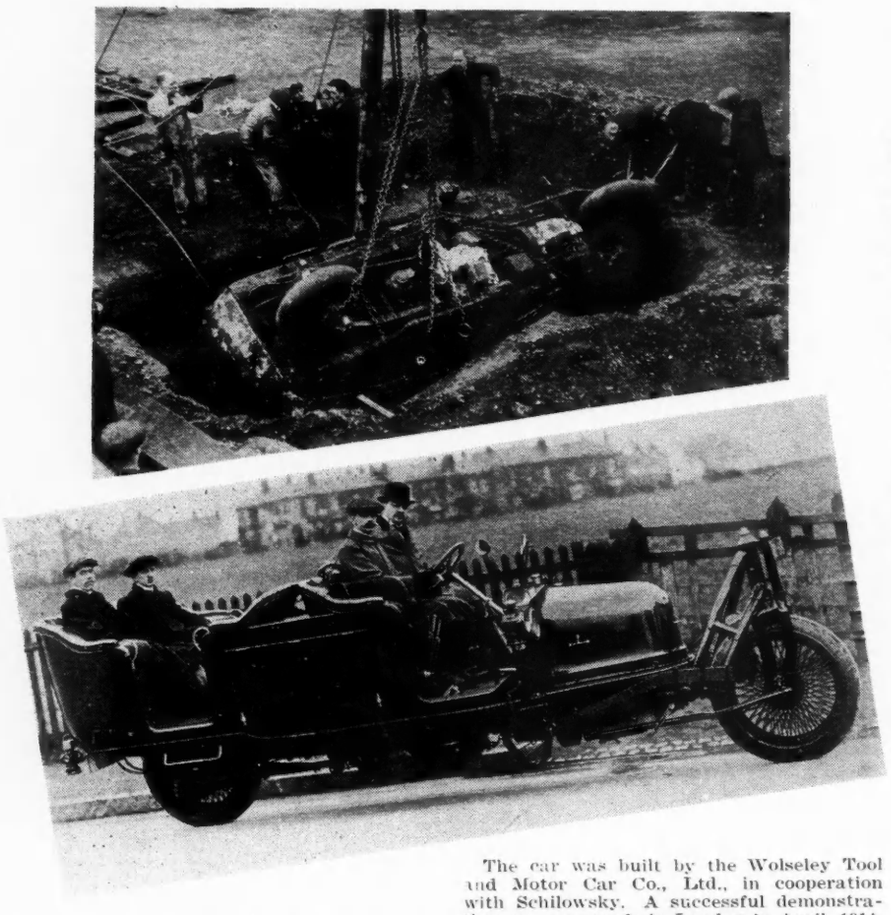
AUTOMOBILES Optimism continues as to prospects for heavy buying season this fall. Used car stocks continue their downtrend. A number of plants began car assembly this week, which will be reflected in increased production figures next week despite the shutdown of a major producer.

MARINE ENGINES One producer holding off announcement of new products to see what course business assumes. Current operations described as "fair" and "seasonal tapering off." Fishing fleets reported making inquiries concerning replacement of worn units.

AIRCRAFT ENGINES Factories continue day-and-night schedules. Numerous recent trans-Atlantic flights stated to be responsible for stimulated interest in private airplanes.

This summary is based on confidential information of current actual production rates from leading producers in each field covered. Staff members in Detroit, Chicago, New York and Philadelphia collect the basic information, in all cases from official factory sources.

(Copyright 1938, Chilton Co., Inc.)



ARCHEOLOGY This remarkable relic of a recent past was unearthed by workmen digging near the Wolseley Automobile Works in England. Investigation revealed that the unusual vehicle was a two-wheeled gyroscopic car invented by a Russian lawyer, Count Peter Schilowsky, in 1912.

The car was built by the Wolseley Tool and Motor Car Co., Ltd., in cooperation with Schilowsky. A successful demonstration run was made in London in April, 1914, and its makers claimed high speeds were possible with a minimum of power and fuel. When the World War broke out, work on the car was suspended and it was buried. Upon its exhumation it was said that replacement of a chain to the pendulum control was all that was necessary to place the vehicle in working order.

Ford Files Exceptions

Company Asks NLRB to Overrule Trial Examiner's Report

Objecting to the report in its entirety on the ground that it is a "nullity" in that it is based upon a proceeding whose conduct denied the company due process of law in violation of the Constitution, the Ford Motor Co. has filed with the National Labor Relations Board a bill of 573 exceptions to the findings of Trial Examiner Tilford E. Dudley which recommended that the company recognize the United Automobile Workers of America as the exclusive collective bargaining representative at the company's assembly plant in St. Louis. The NLRB was asked to overrule the trial examiner's report and to grant the company another 60 days to prepare a brief and present oral arguments.

The report recommended that the board order the company to reimburse 192 workers, 96 of them with back pay, and to replace another five workers on a preferential employment list. The trial examiner, in urging sole bargaining rights for UAW, declared that this CIO affiliate had been chosen for that capacity by a majority of the employes.

The bill of exceptions sharply challenged the findings throughout. The company declared that the UAW "never was and is not now the representative designated or selected for the purposes of collective bargaining by the majority of the workers." It was also stated in the bill that the company never had refused to bargain with UAW.

The company charged that Dudley "was prejudiced and biased in favor of and partial to the UAW."

Objection likewise was made to Dudley's ruling that an interview with Henry Ford in which the automobile manufacturer expressed opposition to labor unions and the distribution of so-called anti-union pamphlets constituted a violation of the Wagner Act.

New Canadian Trim Company To Begin Operations

A new company known as Canadian Automotive Trim, Ltd., Windsor, Ont., has purchased a plant from the Ford Motor Co. of Canada, Ltd., and will commence operations on Sept. 1. This firm will specialize in the fabrication of all interior trims for motor cars.

The immediate investment in the property and equipment is placed at about $160,000. When development is completed it will represent a total investment of approximately $250,000, according to J. H. Grut, secretary. The new firm will have about 65,000 sq. ft. of floor space and expects to employ 250 persons.

The officers of the company are: J. R. Miller, president; C. E. Carpenter, vice-president; W. L. Webster, vice-president and general manager; H. R. Crawford, treasurer; J. H. Grut, secretary, and John Chapman, Jr., assistant secretary and assistant treasurer.

Permanent Automotive Exhibit Planned

James C. Thompson, president of the 20 Wacker Drive Building Corp., has announced that plans have been completed for the establishment of a permanent automotive industries exhibit to be quartered in the Civic Opera Building, Chicago.

The exhibition hall covers an area of 50,000 sq. ft. and will be known as the "Tools and Equipment Exhibit Hall." Local sales organizations will be able to work out of the permanent exhibit.

Opening date has been tentatively set for Oct. 15.

. . . *slants*

MOTOR DEPENDENTS — *Clayton Farris, president of the Trucktor Corp., points out that there are over* 48,000 *communities in the United States that depend solely on motor truck service of various kinds for shipping and receiving contact with the rest of the nation. The State of Maine leads, having* 946 *communities dependent on truck service. Figured on a population basis, this amounts to more than one-third of Maine's population.*

THE MORE THE MORE—*A study of car owning families in the North Central region of this country made by the Bureau of Home Economics.*

Dept. of Agriculture, revealed that the higher the family income became, the greater was the average mileage per year put on the family car. This was found to hold true for city, town and farm families alike.

REFLECTIONS—*Motorists' color preferences for automobiles change from year to year. According to the findings of the General Motors research staff, bright colors gain in popularity in prosperous years and lose when the business picture is less cheerful.*

Buffalo Activity

The Buffalo plant of the Ford Motor Co. reopened Monday on a full production schedule after a two-weeks' shutdown for vacations. All employes laid off two weeks ago have been rehired and a considerable number laid off previously have been called back.

The Buffalo assembly plants of Chevrolet and Fisher Body have been closed until September. Sizable automobile parts and accessory orders have not yet been received by Buffalo manufacturing plants but more active buying is expected around Sept. 1, plant officials said.

No pickup has been felt in Houde Engineering Corp. operations. It was pointed out, however, that Buffalo automobile accessory plants are not so subject as Detroit plants to the violent ups and downs of activity. Houde has been operating a single shift for months.

In the Trico Products Corp. plant the pickup in operations has been "very slight." Other parts makers reported a similar rate of activity.

Chevrolet's Soap-Box Derby Leads to Photo-Finish

Finals in the fifth annual soap-box derby, sponsored by Chevrolet, were held in Akron, Ohio, Sunday.

National and international championship was won by fourteen-year-old Robert Berger of Omaha, Neb. He coasted his "gravity powered" mount down a 1100 ft. specially built runway on Akron's airport in 28.75 seconds, just nosing out Richard Ballard of White Plains, N. Y.

Berger's racer was home built, according to derby regulations, and cost him not more than $10. He was awarded first prize of a $2,000 college scholarship, a large silver trophy and a gold, diamond-set medal. In addition, he and the winners of second and third place were awarded new Chevrolet cars.

Automotive Field Represented at Management Congress

Among the speakers announced in the program of the seventh International Management Congress, to be held in Washington, Sept. 19-23, are men well known in the automotive field. Scheduled to speak are Cordell Hull, Secretary of State; Daniel C. Roper, Secretary of Commerce; Lewis H. Brown, president of the Johns-Manville Corp.; W. J. Cameron, Ford Motor Co.; and Karl T. Compton, president of Massachusetts Institute of Technology.

Included among those who will preside at the various sessions are C. S. Ching, director of industrial and public relations, U. S. Rubber Products, Inc., and Dr. Harvey N. Davis, president of Stevens Institute of Technology.

Mr. Cameron's paper is preprinted on page 235 of this issue.

George C. Phillips

George C. Phillips, production standards engineer for Fisher Body Pontiac division, died last week in Detroit. He had been ill for two months. Mr. Phillips was connected with General Motors Corp. in various capacities for 12 years.

Chrysler Report

Chrysler Corp. has announced that net profit for the first six months of 1938 was $5,709,599.66, as compared with a net profit of $27,456,609.21 for the same period last year.

Sales amounted to $188,125,465.20 for the first six months of this year and included 261,048 passenger cars and trucks. These compared with $409,688,254.17 and 629,706 vehicles for the first half of 1937.

Hudson Motor Loss

Report of Dun & Bradstreet, Inc., indicated that the net loss of the Hudson Motor Car Co. and subsidiaries for the six months ended June 30 was $2,759,532, compared to a net profit for the corresponding period of 1937 of $1,063,475. Net loss for the June quarter this year was given as $1,229,051.

Bordik Helper Springs

The Bordik line of shock absorbing auxiliary springs, a flat helical coil type helper spring, has been placed on the market by Zink-Bordik Products, Inc., Detroit, Mich. These helper springs, designed to carry heavy or uneven loads without resorting to extra spring leaves or auxiliary leaf springs, are said to serve as shock absorbers as well. They may be used in conjunction with ordinary helper springs if desired.

Bordik springs are claimed to control side sway, road bounce, and excessive listing due to uneven loading. Springs and special mountings are available for all popular makes of trucks, commercial vehicles, trailers, buses, passenger cars, and pick-up units.

Books

of automotive interest

WELDING HANDBOOK, 1938 EDITION, *Published by the American Welding Society*, New York. $6.

While there has been no lack of books on the subject of welding, the art is progressing so rapidly that anything published on this subject becomes more or less obsolete in a few years. In order to meet a demand on the part of the mechanical industries for an up-to-date handbook presenting pertinent information on the subject in concise form, the American Welding Society through a Handbook Committee has brought out a Welding Handbook which covers the fundamentals of the various welding processes, the materials used, testing methods employed, and various applications of welding. The book comprises 61 chapters and is the work of some ninety authors. Where a book is thus prepared by men actively engaged in different branches of an industry, there is of course, some danger of biased views being expressed by the authors, and to guard against this as much as possible, all chapters were reviewed by others than the authors, no less than 237 reviewers having contributed their services. Almost every conceivable phase of welding is covered in the 1200 pages of the book, which includes also a great deal of fundamental or basic information, such as welding symbols and their use, methods of testing welds, welding characteristics of different materials of construction, etc. A chapter on Welding of Automotive Products was contributed by C. A. Bowlus of General Motors Corporation, and a chapter on Welding of Aircraft Structures by J. B. Johnson of the War Dept., Air Corps, Wright Field. Altogether the first edition of the Welding Handbook seems to be a very creditable production.

Ourselves and Government

A weekly check list of legislative, executive and judicial actions affecting the automotive industries. First appeared in June 25 issue, p. 831. Corrected to Aug. 18

CONGRESS

Adjourned June 16, sine die. All members of House and 36 Senators retire or face election in Autumn.

Legislative Legacies

MONOPOLY INVESTIGATION. Public hearings by the National Economic Committee (the anti-monopoly committee) may be started in October instead of September as previously planned.

AIRLINES. The five-member Civil Aeronautics Authority, Administrator Clinton M. Hestor, and two members of the Air Safety Board was sworn in on Aug. 8 with the statement by Chairman Edward J. Nobel that the board "hopes to promote through high safety standards, the public's growing confidence in air transportation." The Authority is given broad administrative and regulatory powers over air commerce under the McCarran bill (S. 3345) which becomes effective Aug. 22.

Slated to come before the Authority for immediate consideration is a study of the country's airport system. A report on this is due in Congress in February, 1939. Agency is authorized under the law to direct the installation of navigation aids at airports, some officials going so far as to contend it can build airports itself but this is a legal point which has yet to be decided.

ADVISORY COMMITTEE. President Roosevelt has named the following as members of the new National Advisory Committee for Aeronautics: Col. Charles A. Lindbergh; Orville Wright; Clinton M. Hester and Edward J. Nobel, both members of the Civil Aeronautics Authority; Joseph Sweetman Ames, of Maryland; Edward Pearson Warner, of California; Van Mevar Bush, and Jerome C. Hunsaker, both of Massachusetts.

WAGES & HOURS. Elmer F. Andrews, wage-hour administrator, took the oath of office Aug. 16 preparatory to organizing a staff whose job will be to put the new law into effect Oct. 24. Mr. Andrews called on the President last Monday, announced that textile, garment and tobacco industries will be the first to have industry committees. Present plans are to name industry committees at an early date and limit their membership to 15 persons for large industries, 9 for most of the others, with the public, industry and labor having equal representation. Andrews will name the committees.

DEPARTMENT OF JUSTICE

MONOPOLY. Status unchanged since report in Automotive Industries issue of Aug. 13.

DEPARTMENT OF LABOR

AIRCRAFT LABOR. Public contracts board has withdrawn recommendations to fix a 60-cents-an-hour minimum wage rate for workers in the aircraft manufacturing industry pending a supplementary public hearing scheduled for Sept. 8 in Washington.

CONTRACTS. Public Contracts Board announced contracts totaling $1,832,193.28 for transportation equipment as reported by four Government Departments during the week ending Aug. 11. The largest single contract was for $1,339,704 and covered airplanes and parts to be supplied the Navy by Curtiss-Wright Corp., Buffalo. Next largest contract was for $100,190 awarded to the International Harvester Co. for post office trucks. A number of individual contracts for trucks for the Farm Security Administration, totaling $153,849 also went to the International Harvester Co. Additional contracts for trucks amounting to $59,536 went to the GM division, Yellow Truck & Coach Mfg. Co., Pontiac. Also listed was a $11,380 contract for FSA trucks to be supplied by the Fargo Motor Corp., Detroit. Contracts classified as covering "other machinery" included a $68,925 contract awarded to Allis-Chalmers Mfg. Co., Milwaukee and providing for FSA tractors.

STEEL LABOR. After hearings July 25-26 on SWOC demand that minimum common labor rates per hour in steel industry be fixed at 62½, 60 and 45c. in the east, west and south, respectively, the Board set Aug. 8 as the deadline for filing wage data and Aug. 22, for filing briefs. Final action not expected before late September and may apply to Ford steel plants. Board eventually plans to cover all industries doing Government business, including the automobile industry, although it may be among the last to be considered.

LABOR RELATIONS CASES

FORD vs. N.L.R.B.: Latest development given on page 214 of this issue. See "Ford Files Exceptions."

NLRB has scheduled a run-off election to determine final results of the June 20-22 elections among employees of the Shell Oil Co., San Francisco. Machinists will vote for or against the CIO's oil workers union. Boilermakers will vote for either the CIO's oil workers union or the International Brotherhood of Boilermakers, Iron Shipbuilders, Welders and Helpers of America, an AF of L affiliate.

NLRB has issued an order against Precision Castings Co., Inc., Fayetteville, N. Y., charging that the company discouraged membership in the AFL's molders union and allegedly discharging six employees in 1935 for union activities. The order directed the firm to cease alleged discrimination against workers and other unfair labor practices.

FEDERAL TRADE COMMISSION

INVESTIGATION under the Withrow-Minton Resolution (M. J. Res. 351). Status remains unchanged since report in Automotive Industries issue of Aug. 13.

F.O.B. PRICES case vs. G.M. and Ford. Date for hearing originally expected to be fixed for some time in August, now expected to be set for after Labor Day. Complaint alleges advertising misleading because prices do not include standard equipment.

VS. GENERAL MOTORS on question of forcing dealers to purchase parts and accessories from G.M. sources only. Hearings were resumed in New York on Aug. 16. Everett Haycraft is FTC attorney in charge.

SIX PER CENT CASE. F.T.C. cited Ford and General Motors in July, 1937, complaining of false and misleading representations in advertising prices of automobiles. Complaint alleges advertising 6 per cent charge on deferred payments by retail purchasers is misrepresentation because no provision is made for amortization. Case now in hands of trial examiner.

FAIR TRADE PRACTICE rules for retail automobile dealers, introduced at public hearings during last NADA meeting in Detroit (see A.I., April 30, 1938), are still under study by the FTC fair trade practice division headed by George McCorkle.

INTERSTATE COMMERCE COMMISSION

Effective Oct. 1, the ICC has prescribed a maximum driving day of 10 hours to be followed by an 8-hour off-duty or rest period, or a weekly limitation of 60 hours on duty, for truck and bus drivers of common and contract motor carriers. The Public Health Service has been directed to conduct studies covering the fatigue problem, and the ICC Motor Carriers Bureau will make further studies of accident reports "for the light they may throw on the effects of safety of operation of different periods of duty."

STATE DEPARTMENT

RECIPROCAL TRADE AGREEMENT signed with Ecuador under which passenger automobiles constitute the most important industrial item to receive duty reductions. They were: on cars valued at $600 or less, 40 per cent reductions in tariff rates; on cars above $600, 40 per cent reduction on the $600, plus a 38 per cent reduction for the excess valuation above $600; on busses, 25 per cent reduction in rates; and automobile parts and accessories, 50 per cent reduction. Bus chassis and trucks were bound at the former duty of 10 per cent ad valorem.

In 1937 this country sold to Ecuador passenger cars valued at $114,000, automobile parts and accessories valued at $82,000, and trucks and chassis (chiefly chassis) including bus chassis valued at $413,000. The latter item accounted for more than eight per cent of this country's exports to Ecuador.

All-Time Auto Peak

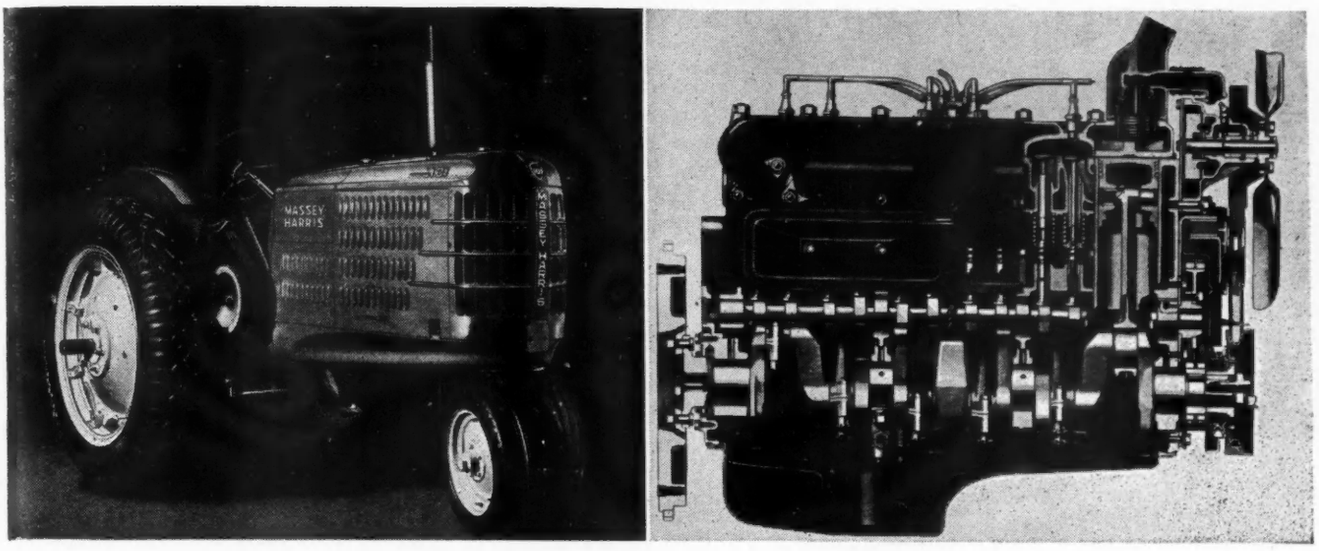
New Record for Motor Vehicle Use Set for Fifth Consecutive Year

Secretary of Commerce Roper reported on Wednesday that for the fifth consecutive year the world use of motor vehicles increased to a new all-time high of 43,078,630 units. These were in operation on Jan. 1, and excluded motorcycles.

The present peak in automotive registrations, the report showed, represents a gain of 2,518,463 vehicles, or 6.2 per cent over the total recorded twelve months previous. At the beginning of the present year 30,041,292 vehicles were operating in this country, an increase of 5.3 per cent over the 28,520,559 reported in use on Jan. 1, 1937. Automobile participation in all other countries combined showed an advance of 8.2 per cent, bringing their present total to 13,037,338 units, the Secretary said.

Out of a world registration of passenger cars, trucks and buses, American makes represent 81.7 per cent. Out of all cars registered abroad, American makes represent 39.6 per cent of all the units. During the past 10 years, world motor vehicle registrations have increased by 45 per cent, bringing the ratio to one automobile for every 48 persons in the world as compared with 1 to 64 a decade ago. Excluding the United States, the present ratio is 1 to 137 persons. The report cited these extremes: United States, one car for every 4.5 persons; Liberia, one car for every 12,821 inhabitants. It listed the United Kingdom, France, Germany, Canada and Australia as the leaders in the order named in the use of motorized transportation.

(Turn to page 220, please)



Massey-Harris Model 101 with Modified Plymouth Truck Engine

Modified Plymouth Engine In New Tractor

A new farm tractor, developed by the Massey-Harris Co., Racine, Wis., and designated as the "Massey-Harris Model 101," has recently been introduced to the farm market.

Of particular interest to readers of AUTOMOTIVE INDUSTRIES is the fact that the engine used in this tractor is a modified six-cylinder Plymouth truck engine, supplied by the industrial engine division of Chrysler Corp., in Detroit. The engine has a bore of 3⅛ in., stroke of 4⅜ in.

Among the most important of the special features of the engine are the following: new manifolding of updraft carburetion, heavy truck-type clutch, truck-type engine mountings and self starter as standard equipment. The self starter is considered a novelty in moderately priced tractors.

Another feature is the use of the standard Plymouth combustion chamber with 6.7 compression ratio head, burning gasoline fuel exclusively. The engine is completely sealed for the low speed dust laden operating conditions, incorporating a heavy-duty tractor type air cleaner and the standard Purolator oil filter with renewable cartridge.

Massey-Harris emphasizes the "twin power" feature of the tractor, achieved through unique automatic governor control built into the engine. Heart of the device is a centrifugal governor which controls engine speed for plowing at 1500 r.p.m. This is one range of power development. The other range is for belt work, this being done at an engine speed of 1800 r.p.m. The increase in controlled speed is automatically accomplished by a special mechanism which comes into play as the shift is made into belt drive. Simultaneously, the main transmission is cut out so that the higher engine speed is never available for ordinary running operation.

Motorists' Association Formed

The launching of a nation-wide campaign to bind together owners and operators of passenger automobiles in order to deal collectively with questions of highway use and safety as affected by federal and state regulation and particularly to obtain more stringent and more uniform regulation of buses and trucks, their size and speed, was announced Thursday by the sponsors of the new association which has been chartered in the District of Columbia in the name of Organized Motors, Inc.

Its president is Charles J. Tilden, who is chairman of the committee on transportation at Yale University, president of Eno Foundation for Highway Traffic Control, Inc., and who has served as research specialist, U. S. Bureau of Public Roads.

Advertising News Notes

H. E. Christiansen has joined the staff of Henri, Hurst & McDonald, Inc., Chicago, as merchandiser and account executive. Mr. Christiansen is secretary of the American Machine Parts Association.

Marsh K. Powers has joined the Glenn L. Martin Co. as assistant to the president in charge of advertising. Mr. Powers as president of the Powers-House agency, Cleveland, has served the airplane company as advertising counsel for several years.

George T. Metcalf, president, Geo. T. Metcalf, Inc., Boston, was chairman of a committee of the National Advertisers Association which has drawn up a check list of 12 points to be observed in preparing industrial advertising copy.

Despite strong pleas of public-spirited highway, park and conservation spokesmen, the use of billboards in New York will not be restricted in the state's new constitution being drafted by the Constitutional Convention sitting in Albany. Existing regulations are sufficient, the majority decided.

Major Bowes and his "Amateur Hour" have been signed up by Chrysler for its third period of 52 weeks on 78 Columbia Broadcasting Co. stations, Ruthrauff & Ryan, the agency, announced. Auditions on the Bowes program run from 500 to 600 amateurs a week. From six to 17 travelling units of the better amateurs have been on the road at one time.

The fall and winter "Voice of the Farm" Firestone noonday radio series began last week over a chain of 83 stations.

The Texas Co., through Buchanan & Co., Inc., has signed up for a weekly one-hour program with Columbia Broadcasting Co. Radio circles are saying that the talent will cost upwards of $20,000 weekly.

"The great radio spy case" came to an end in Pittsburgh when Federal Judge F. P. Schoonmaker enjoined station KQV from peeking and telling all on the ether waves. Socony-Vacuum Oil and General Mills contracted with the Pittsburgh Pirate management for exclusive play-by-play descriptions. But the enterprising station stationed an announcer on the roof of a nearby house and, focusing his field glasses, he pirated the Pirate home games.

Sixty-one stations of Columbia will broadcast Gulf Oil's "Passing Parade" every Sunday evening for a half-hour. Young and Rubincam is the agency.

The new safety theme in advertising launched this month by Transcontinental and Western Air, Inc., is based on a survey which disclosed that most business executives don't believe the safety statistics issued from time to time. Answers to the question "how many people were killed in air accidents in 1927," for example, gave an average estimate of 1700 per cent over the actual number. Emerson Foote, account executive, J. Stirling Getchell, is responsible for "pointing up" the campaign.

Labor

Definite Employment Boost as Producers Groom Lines

Brightest outlook for employment in the automotive industry, since the Automobile Show of last year, is visioned by authoritative agencies in Detroit. With a number of important producers grooming their final assembly lines this week, employment figures have been given a positive, if not high, percentage boost due to immediate activity in parts plants, body plants, and motor car machine shops and tool departments.

Detroit Board of Commerce reports that employment has taken a definite upturn since Aug. 1. Ford is reported to have called some 24,000 men; other Detroit manufacturers started calling production workers and tool makers last week. Many final lines should be well manned by the beginning of next week.

Meanwhile the UAW front is seething with internal strife and uncertainty. The so-called "rebels" who are supporting the four expelled international UAW officers met last week-end at Toledo, as advised in AUTOMOTIVE INDUSTRIES, Aug. 13. The group assembled adopted a resolution to call another meeting of delegates and officers of local unions throughout the U. S., at Toledo on Aug. 20. Purpose of this meeting is to issue call for a special convention to oust President Martin.

Rims Inspected and Approved

Rims inspected and approved by the Tire & Rim Association for July this year numbered 406,419. Total for July last year was 1,702,105.

The first seven months of 1938 were approximately 67 per cent below the same period last year. Rims inspected and approved for the first seven months of 1938 numbered 4,472,911; for 1937, 14,615,278.

40 Years Ago

with the ancestors of AUTOMOTIVE INDUSTRIES

Wire Spokes

Builders of motor vehicles find difficulty in obtaining wire spokes of the proper strength to resist the unusual strains to which the wheels are subjected. A particularly weak point is the head of the spoke which is apt to break off because of crystallization. The Wire Goods Co., of Worcester, Mass., have taken the trouble to prepare a special spoke for this work, made of suitable stock to stand the strain. The heads are turned up hot to prevent crystallization, and are not annealed after they are bent, requiring no annealing. The metal is flowed around hot and stiffens up again.

From *The Horseless Age*, August, 1898.

Fumes Trouble Eyston In Practice Runs

It was reported that Capt. G. E. T. Eyston tried out his world record-holding "Thunderbolt" on Tuesday and was nearly asphyxiated when fumes filled the enclosed cockpit. The test run on the Bonneville Salt Beds was said to have been made at a speed of 270 m.p.h.

Eyston said that a respirator which drew fresh air into the cockpit was all that saved him. The fumes were reported to have been caused by the brakes which would not have caused the trouble, Eyston said, had they been rubbed down.

The famous speed driver estimated the track will not be sufficiently dried out until next week to permit runs at full speed. Then he hopes to break his present record of 312 m.p.h.

A.F.A. Fall Conference

Included in the participants on the program of the fall technical conference of the American Foundrymen's Association, to be held at Ann Arbor, Mich., Sept. 15-17, are A. L. Boegehold, General Motors Research Laboratory; F. A. Melmoth, Detroit Steel Casting Co.; H. M. Wright, Michigan Malleable Iron Co.; E. R. Darby, Federal-Mogul Corp.; V. A. Crosby, Climax Molybdenum Co.; J. Corfield, Michigan Steel Castings Co.; R. H. McCarroll, Ford Motor Co.

Yellow Truck and Coach Bus Order

Yellow Truck and Coach Manufacturing Co., division of General Motors Truck Corp., has received an order for 100 buses with seating capacity for 60 persons and room for 60 standees. The order was placed by the Greyhound lines.

The buses will operate on the exposition grounds of the New York World's Fair. They will be equipped with hydraulic torque converters combined with Diesel engine power.

Farm Machinery Outlook Favorable

Despite the present lull in farm machinery demand, the longer term prospects for the agricultural machinery companies remains impressive, says the United Business Service in its current weekly report.

Sales of farm machinery in the early months of 1938 were substantially below last year. However, indications are that at least a modest upturn should be evidenced through the fall period. Prospects are that this uptrend will extend well into 1939. While full year sales of tractors, combines harvesting machinery and the like will not attain the peak reached in 1937, the report stated, they should compare favorably with other years.

Canadian Used Car Inventories

Although used car inventories are considerably higher in Canada this year than in 1937, it is anticipated that no great difficulty will be seen in clearing away this accumulation well in advance of the new car shows.

It is believed, however, that some price reductions may be necessary to accomplish this result in certain areas. A Dominion-wide survey of the used car situation shows that stocks are 21 per cent larger in number, 24.5 per cent higher in value, and contain a greater number of late model cars than at this time last year.

Conditions this year, it is said, are decidedly different from those of 1937. Last summer it was confidently expected that new car prices would be increased with the advent of new models and this knowledge tended to stiffen used car prices prior to the shows. In due course, new car prices were advanced with the result that dealers continued to trade on the basis prevailing in the summer months, trusting that used cars would continue to move out satisfactorily. This hope, it is learned, has not been realized, as is evidenced by larger stocks at higher values in many centers. The increase in values being due principally to the numbers of late models included in these inventories, which have remained unsold at the prices asked.

Mexico's 1937 Imports

Automotive vehicles and accessories accounted for one-sixth of Mexico's imports last year, according to the Economy Ministry. More than 80 per cent of Mexico's pur-

chases of automotive vehicles and accessories last year were purchased in the United States. Six and eight cylinder five-passenger cars were the most popular.

Great Britain, France, Germany and Italy were the other countries from which Mexico bought automotive vehicles in 1937. Cars and calibers and capacities imported last year were: Six-passenger, four to six cylinder—8522; six-passenger, six to eight cylinder—4292; more than eight cylinders and of various capacities—540, and up to four cylinders—359, a total of 13,935 automobiles. Imports of trucks in 1937 totaled 10,110. In addition, 2850 automobiles, 5222 trucks and 1334 chassis were imported last year for assembly.

Imports of tires and other rubber accessories dropped to 873,955 pesos from 1,307,876 pesos in 1933. This was attributed to expansion of the Mexican rubber industry. There are 14 rubber goods factories in Mexico.

Goodyear Report

Net sales amounting to $78,151,636 were reported for the first half of 1938 at Monday's meeting of the board of directors of the Goodyear Tire & Rubber Co. This figure compares with $116,475,700 for the similar period last year.

Consolidated earnings were $3,507,320 before interest and other charges, resulting in net consolidated earnings of $1,669,828.

Bulletin No. 321, recently released by the Chain Belt Co., describes the complete line of Rex **construction equipment.***

The Wrought Washer Mfg. Co. has released a new stock list, No. 55-B, covering **standard and special washers.***

Pratt & Whitney division Niles-Bement-booklet describing and illustrating the **Series "C", Twin Wasp engine.***

Magnus Chemical Co. has published a folder describing its **cement cleaner.***

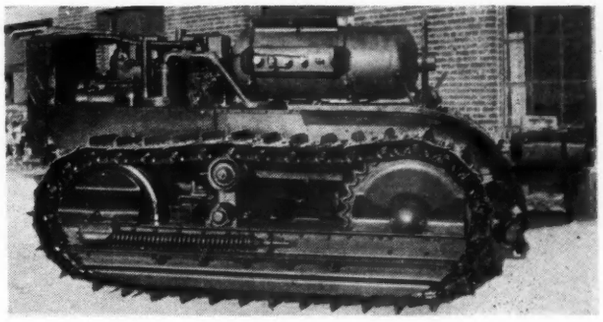
Pratt & Whitney division Niles-Bemont-Pond Co. has released two circulars. One, No. 443, covers the new Pratt & Whitney **bench lathes** in 7 in. by 16 in. and 10 in. by 20 in. sizes. The other, No. 412-1, covers the Pratt & Whitney No. 2A **jig borer.***

Pratt & Whitney has released also a new circular, No. 441, describing its **standard measuring machine.***

* Obtainable from editorial department, AUTOMOTIVE INDUSTRIES. Address Chestnut and 56th Sts., Philadelphia.

CONVERSION

A track-type tractor in service on the West Coast, is equipped to burn Algas, a new blended fuel composed of a mixture of butane and propane, having an average octane rating exceeding 100. The fuel container is seen on top of the tractor.



Executive Personnel Changes Made at Reo Plant

Sweeping changes in personnel and physical properties of the Reo Motor Car Co. were announced this week by Rowland Campbell, executive vice-president and chairman of the board. Resignation of Col. Fred Glover as president and general manager, and of Earle W. Goodnow, director, were highlights of the important personnel changes. Resignation of M. D. Harrison, chosen as director at last meeting of the board, also was accepted.

Until further notice, Mr. Campbell will take over Col. Glover's duties as acting president.

Mr. Campbell announced that rigid economy will be the order of the day. Part of this program is concentration of production and office facilities within the limited space required for efficient operation. Surplus space is to be offered to outside tenants, it is reported. Older buildings, many of which are of obsolete wood construction, are to be razed, according to the reports current in Lansing.

ICC Fixes Minimum Rates For Motor Carriers

Efforts by members of the trucking industry to stabilize the truck rate structure and halt destructive rate wars received the backing of the Interstate Commerce Commission last Tuesday when the agency invoked powers conferred by the Motor Carrier Act and fixed minimum rates for the two most important transportation areas — New England and Central States regions. The rates become effective Oct. 5.

The New England rates, which also affect parts of upstate New York, northern New Jersey and the New York metropolitan area, will represent an increase estimated at 1½ per cent, but these will be effective for one year with the case to be reopened again after six months, at which time the carriers will submit new schedules based on their exxperience.

Rates fixed in the Central States region will affect rates between points in Illinois, Indiana, Kentucky, Iowa, Michigan, Missouri, parts of New York not covered by the New England decision, Ohio, Wisconsin, Pennsylvania and Virginia, and amount to an estimated 12 per cent increase over rates in effect before March 28—a 3½ per cent increase plus the general increase authorized in the general railroad rate case this spring.

In the New England decision, the commission expressed itself as convinced that an emergency exists requiring government action. It said the emergency resulted from competition within and without the motor carrier industry and from "the depression in business which has materially reduced the amount of available traffic."

California Caravan Act Declared Unconstitutional

A report from the Automobile Manufacturers Association indicates that the California Caravan Act was declared a discriminatory burden on interstate commerce by the United States District Court for the Southern District of California in finding the Act unconstitutional.

The court stressed the point that the 15,000 cars brought in for sale on their own wheels were but one and one-half per cent of the total of 1,015,886 cars that crossed the state borders. The court also stressed the facts that the fees of $7.50 per car for the use of the highways, plus $7.50 as cost of policing, have produced $112,500 in revenue; that the movement presented no problem justifying the expenditure of such an amount, and finally, that nothing is charged under similar conditions within the state except when a car for sale passes from one zone to another, which is infrequent.

One Justice dissented on the ground that the Act is a valid exercise of the police powers of the state.

BUSINESS IN BRIEF

Written by the Guaranty Trust Co., New York

Despite some drawbacks, business activity continued its upward trend and registered the fourth consecutive weekly gain. The index compiled by the *Journal of Commerce* stood at 75.1, as compared with 74.2 the week before and 100.5 a year ago. Steel operations reached a peak for 1938, and electric output was the highest for the year. There was a moderate rise in automotive activity, while petroleum runs-to-stills and bituminous coal production declined.

Railway freight loadings during the week ended August 6 totaled 584,050 cars, which marks a decline of 4653 cars below those in the preceding week, a reduction of 182,132 cars below those a year ago, and a drop of 144,321 cars below those two years ago.

Production of electricity by the electric light and power industry in the United States during the week ended August 6 was 6.4 per cent below that in the corresponding period last year. Output during the preceding week was 7.2 per cent below that a year earlier.

Lumber production during the week ended July 30 stood at 61 per cent of the 1929 weekly average. Reported output was about the same as in the preceding week, which was the highest for the year to date. Both new orders and shipments were somewhat smaller.

According to a recent announcement by the Department of Agriculture, the latest estimate of the corn crop places the yield at 2,566,-221,000 bushels. It was stated that the indicated supply of corn has not reached the "excessive" supply level; and, therefore, it will not be necessary to hold a referendum among the farmers on marketing quotas.

Average daily crude oil production for the week ended April 6 amounted to 3,317,850 barrels, as against 3,316,400 barrels for the preceding week and 3,651,150 barrels a year ago.

Professor Fisher's index of wholesale commodity prices for the week ended August 13 stood at 80.2, as compared with 81.0 the week before and 81.6 two weeks before.

The consolidated statement of the Federal Reserve banks for the week ended August 3 showed a gain of $1,000,000 in holdings of discounted bills. Holdings of bills bought in the open market and of Government securities remained unchanged. Money in circulation increased $1,000,000, and the monetary gold stock rose $8,000,000.

Auto Peak

(Continued from page 216)

The current situation in the automobile industry as reported by the Automotive-Aeronautics Trade Division, Department of Commerce, follows:

"While automobile production is, at this time, at the low point of the year, it is expected that this will show early improvement, as one of the large producers resumed operations this week. Inventories in the hands of dealers have been reduced almost constantly since last December. The rate of reduction appears to have been steadily increasing, culminating in what, at this stage, seems to have been a decrease of about 60,000 passenger car units last month. By the end of August, dealers' stocks may be expected to drop another 80,000 units, bringing average cars on hand per dealer to less than 4 units. This would be the lowest inventory position since 1934.

"Meanwhile the steady reduction of second hand stocks has been progressing at an accelerated rate. Reports indicate that dealers in many sections of the country are being hampered in their sales activities, due to low stocks, and are forced to obtain cars from various metropolitan areas, where inventories are somewhat larger than desired. Needless to say, prices for second-hand cars are stiffening through the fact that demand is running ahead of supply.

"Resumption of operations will be staggered throughout the month of September, which means that output figures will stage a slow steady rise until the end of October. Not until that time will the automobile industry be in full swing again. Last year the rise in production was a rapid one, culminating, as will be the case this fall, about show time.

"The recall of men to work in the automobile companies in Detroit and some other cities this week, started the first upward turn in employment, particularly in Detroit, since last October."

Plymouth Shows Large Gains in "Big Three" Class

Total new car registrations in 100 leading cities for June, completing the first half of 1938, show important gains for Plymouth among the three largest automobile producers. For the second quarter, Plymouth scores first or second place in 37 key markets of 16 different States—more than doubling the gains registered when this year passed the first quarter mark.

In metropolitan New York, Plymouth again led the industry with first place in sales—by a margin that increased in the second quarter to 50 per cent ahead of its nearest competitor. In 11 other cities new Plymouth registrations outnumbered all other makes, including Washington, Miami, Boston, Philadelphia and Pittsburgh.

In the second quarter Plymouth held first or second place in key markets. During June alone, new Plymouth registrations ranked first in 24 leading cities and ranked second in the industry at 32 additional key points.

Air Bureau Chief to Resign

Secretary of Commerce, Daniel C. Roper, has confirmed a report that Denis J. Mulligan, chief of the Bureau of Air Commerce, will resign from this position within a few days. No reason for the resignation was given.

The new five-man aeronautics authority comes into being on Monday and will absorb the Bureau of Air Commerce. As this leaves Mr. Mulligan virtually with no standing in the department, it is believed to be the reason for the resignation.

Cummins Diesel Orders

During the last 30 days, the Cummins Engine Co. has received orders for 112 engines for the Colonial Sand and Stone Co., Inc., of New York City. Sixty-two were for the four-cylinder model for replacements in old trucks and 50 of the six-cylinder

model will be installed in new Mack trucks now being built at the Mack factory in Allentown, Pa.

The 50 new Cummins Diesel-powered trucks were purchased by the New York concern at a cost of approximately $500,000. It is said to be the largest single order ever placed for this type of truck for use in the United States.

The Cummins Engine Co. is now operating on the largest production schedule in its history and is carrying on an extensive expansion program. Additions to two of the present buildings are being constructed and work on a new factory building, in which the Cummins Diesel fuel system will be manufactured, is scheduled to start immediately.

P. E. Letsinger, vice-president in charge of sales, states that the Cummins Engine Co. plans to double their present production during the next 12 months in building a new smaller Diesel engine built in four and six cylinder sizes (4 in. bore and 5 in. stroke) which has just started to come off the line.

The company has operated at near capacity for the past six years, and the present expansion program is its fifth during this time.

Articulated Bus Given Tests

Called the "world's largest" a new twin coach bus designed by the Twin Coach Co. was given tests in Akron, Ohio, traffic on Monday.

With a "street car" capacity of 120 to 140 passengers, the new unit resembles two coupled coaches. It was reported to be nearly 50 ft. in length, weigh 27,500 lb., and to be capable of attaining a speed of 50 m.p.h.

A flexible rubber hood, developed by the B. F. Goodrich Co., articulates the twin coach unit. Coordinated steering of front and rear wheels permits a short turning radius.

Buick July Sales

July retail deliveries of the Buick division of General Motors totaled 12,254 units, about a thousand cars over original estimates for the month, and represented a less than normal seasonal decline under June, according to figures released by W. F. Hufstader, general sales manager.

At the same time, the month wound up with a substantial increase in used car deliveries, 11,500 used cars being sold in the last 10 days, compared with 9900 in the previous period. Buick dealers in the United States sold 29,799 used cars during July, compared with 29,814 in June.

The July new car sales compared with 13,463 units delivered in June, a decline of 8.2 per cent. The normal June to July drop is 12.4 per cent, Mr. Hufstader said.

Stearman-Hammond Hearing Date Set

Petition of the Stearman-Hammond Aircraft Corp. for reorganization and relief under Section 77-B of the Bankruptcy Act was approved and an order was filed on July 26 temporarily continuing the corporation in possession of its properties and authorizing it to continue business pending further order of the court. Notice has been given of a hearing to be held in San Francisco, Aug. 22, to determine whether or not the court shall continue the corporation in possession or appoint a trustee or trustees.

Automotive Metal Markets

Fourth-Quarter Steel Price Announcements May Reveal Advance

If precedent is followed, there should be an announcement of fourth-quarter steel prices around the first of next month. The predominant opinion in the steel market is that prices will be left as they are, but it is rather significant in the present state of steel market affairs that in some quarters the possibility of an advance has been discussed more or less seriously. With attainment this week of a 40.4 per cent rate of ingot production, the temptation to speed up the placing of commitments by the orthodox scheduling of higher prices for the next quarter, prompt buyers being meanwhile afforded every opportunity to cover before the rise, is hardly a new symptom. Steel market developments in the last few weeks have shown that in some finished steel descriptions, such as cold rolled sheets, the lower prices announced last month are far from immune against further competitive attrition, and more important than any other immediate consideration is to steer clear of all complications that might in anyway cause hesitance on the part of automotive consumers, from whom heavy tonnage business is confidentally expected in the next few weeks. Influence on the market of whatever the final decision of the Government Contracts Board in the matter of minimum wage standards may be, is likely to be less than at first thought. If steel mills are enabled to step up production to 50 per cent of capacity, quite a few are expected to break even, and the problem of re-establishing more profitable operations through wage scale adjustments will then be no longer quite so pressing as it was. In seeking a picture of what changes the basing point upheaval will bring, most steel market observers blur the perspective under conditions of abnormally heavy demand. It is argued that if mills in Pittsburgh, for instance, should be overrun with business from nearby consumers, their enthusiasm for long-haul business would not be what it is when demand is light. This leaves out of consideration the fact that, no matter whether demand is light or heavy, the bulk of the output of the continuous rolling mills goes into automotive consumption and that, while it may be possible to turn down long-haul business in heavy rolled steel, the heavy investment in continuous mills is not amortized by rail mills having more orders than they can fill. In fact, from the day when the old basing point system went into the discard, mills specializing in automotive steels, have let their customers, no matter where their plants, given to understand that they would not permit freight rate advantages to divert business to more favorably located competitiors.

Tin importers and brokers have been advising their customers to buy before the maneuvers of the Buffer Pool management send the price to around 45 cents, the minimum under its program. Consumers are offish, however, and at the beginning of the week offers of spot Straits at 43 cents failed to uncover any demand. The market yielded further ground on Tuesday, when 42⅞ cents was the price asked.

On statistics, that were construed as favorable to producers, the copper market held up well in spite of dullness here and slightly less buying for armament in Europe. The movement of actual copper into foreign consumption is reported to be holding up.

Spot electrolytic was quoted at 10⅛ cents, with the export price down to 10 cents.

Secondary aluminum producers reported booking more business from automotive consumers.—W. C. H.

Henry Ford Presented Model of "First Practical Auto"

The Daimler-Benz Co., of Germany, in remembrance of Henry Ford's seventy-fifth birthday and of his visit to the company's plants in 1931, presented to him working scale models of what are claimed to be the first practical automobile and the first motor-powered bicycle.

The model is one-fifth the size of the original passenger vehicle powered with a gasoline engine and built by Carl Benz in 1885. The original Benz is now in the German museum at Munich. It has a horizontal one-cylinder engine of three-quarters hp., located under the seat. The cylinder has a 3½-in. bore with a 6-in. stroke.

The piston displacement is 58 cu. in. The vertical crankshaft with counterweights carries a horizontal flywheel at its lower end. The exhaust poppet valve is located on the cylinder head; the intake slide-valve on the side of the cylinder; the horizontal camshaft runs at half engine speed and carries the driving belt pulley.

The chassis consists of a tubular frame with cross-members. It weighs 580 lb. and at 436 r.p.m. of the engine ran 10 m.p.h.

MEN OF THE INDUSTRY

SAM C. MITCHELL has resigned from his post as director of advertising and sales promotion of the Kelvinator division of Nash-Kelvinator Corp.

NEIL S. GARDNER has been appointed production manager of Covered Wagon Co. to succeed **D. R. DONALDSON.**

HARRY O. MUNN has been placed in charge of the Buffalo office recently opened by the Lindberg Engineering Co.

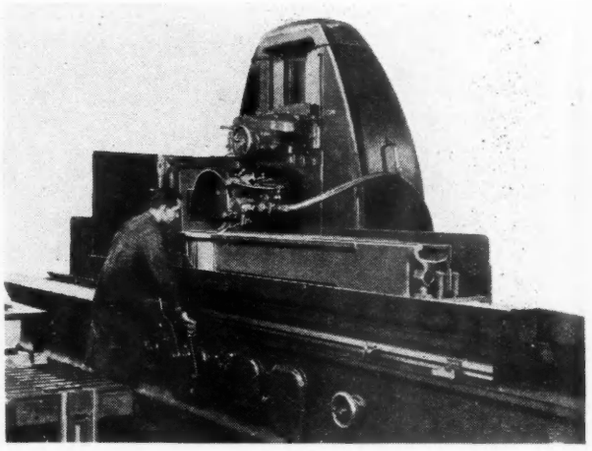
Magnus Chemical Co., Inc., announces three appointments in its sales department. **RAYMOND D. KENNEDY** becomes resident sales representative in Philadelphia; **WILLIAM F. NEWTON** represents Magnus in California; **DOUGLAS L. FOSTER** will represent Magnus in western New York State.

B. J. HASKINS, for many years chief engineer of Jos. Wiedenhoff, Inc., has resigned from his more recent position as vice-president in charge of engineering of the Potter Co.

FRED L. BEELBY has been appointed regional manager of the Pittsburgh branch territory of the Studebaker Corp. He succeeds **M. E. HEWINS,** who has resigned. **M. M. SCOVILL** has been appointed assistant to Mr. Beelby.

The Automobile Manufacturers Association has announced the addition of **WILLIAM H. McCAUGHEY** to its Public Relations division at its New York office.

TOOLS OF TOMORROW

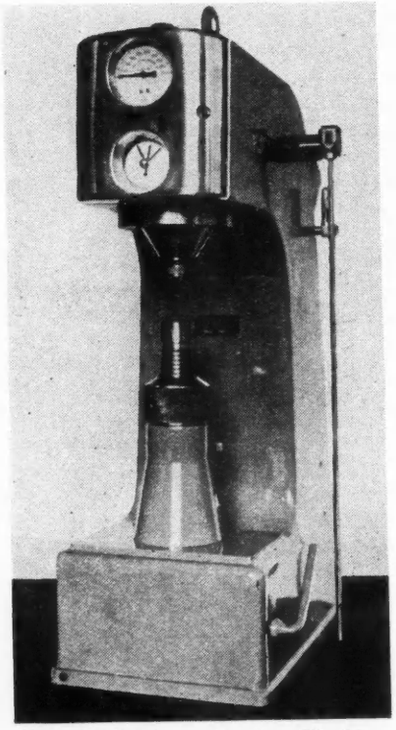


High-powered precision surface grinder (24-in. by 30 in. by 144 in.) built by Mattison Machine Works, Rockford, Ill., set up for grinding hardened V-shaped and flat ways of lathe bed. This equipment is especially recommended by the manufacturer for grinding hardened V and flat ways to high limits of accuracy and smooth finish.

Hardness Testing Machine

. . . Built to withstand severe production usage.

The Detroit Testing Machine Co. has introduced a new direct reading hardness testing machine. Outwardly the machine presents the same general appearance as previous machines marketed by the company but the interior mechanism is different in both arrangement and principle. Maintenance is said to be negligible as there are no delicate mechanisms or electrical gadgets to get out of order, and inasmuch as the piston is of the ground, packless, self-guided type and of generous proportions, it should give years of service without attention. There are no diaphragms to break or replace.



Detroit Hardness Testing Machine

The operating mechanism eliminates the use of a piston return spring. Thus, this tester is not subject to error from this cause and the test load remains the same regardless of the heighth of stroke. There is no exposed piping as this, together with operating valves, etc., is contained within the body of the machine and all overflow is directly back into the reservoir.

The work screw and screw support may be locked rigidly, preventing shake and wear and the top of the base, directly under the test ball, is machined to provide ample footing for special fixtures if required. These fixtures may be interchangeable.

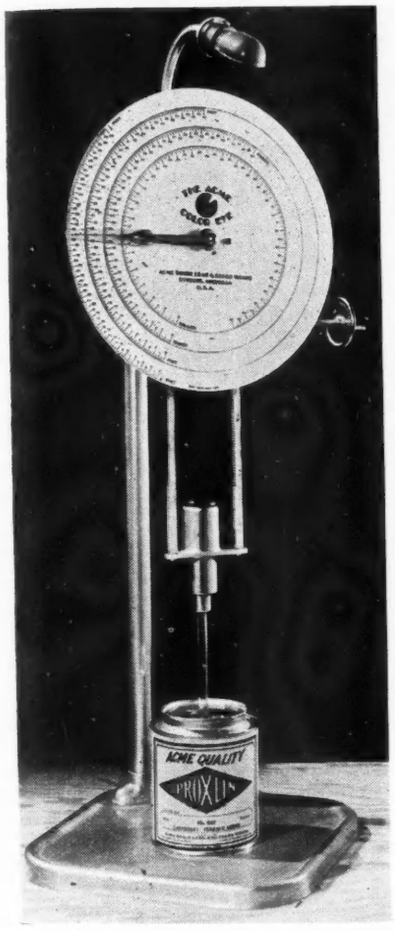
To meet unusual conditions, adjustment of both primary and test loads may be effected instantaneously from the outside of the machine without dismantling or disturbing anything else.

The motor-driven pump is of the rotary gear type. Parts are hardened and ground and the shaft is ball bearing mounted. Ordinarily a standard 1/3 hp., 120 volt, 1725 r.p.m. ball bearing motor is supplied but since the drive is direct by means of a flexible coupling, it is a simple matter to substitute another motor or replace the original at any time.

The operating valve is directly connected to a foot treadle thus leaving the operator's hands free.

Tests per hour, it is said, are limited only by the ability of the operator to handle the work and, as no grinding or glass reading is required labor costs are reduced.

A plain power Brinell machine, incorporating all the improvements listed above, with the exception of the direct reading feature, has also been introduced.



Color mixing device developed by the Acme White Lead and Color Works. Required proportions of basic tinting colors are indicated on the lighted dial. This automatically establishes the level of a transparent rod which extends into the mixing can. A light beam travels down this rod of special transparent composition and is reflected in the surface of the colored substance in the can. The instant the colored material reaches the correct level and touches the end of the illuminated rod, the reflection automatically disappears, giving an instantaneous stop-pour signal.

Diesel-Electric Locomotives

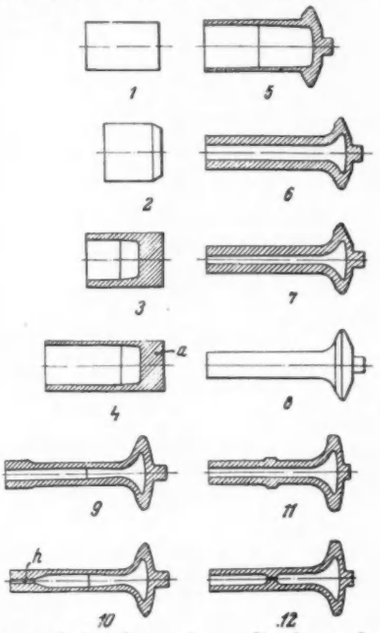
The Chicago, Rock Island & Pacific railroad has leased 16 additional Diesel-electric locomotives from the Electro-Motive Corp. of LaGrange, Ill., subsidiary of General Motors Corp. This brings the total of Diesel driven engines leased by this road to 37.

AUTOMOTIVE ABSTRACTS

Production of Blanks for Salt-Cooled Poppet Valves

A new process for the production of blanks for poppet valves that are to be cooled by means of salts or sodium partly filling a chamber formed in the valve head and stem, has been patented by Mark Birkigt, a well-known French automobile engineer and designer of the Hispano-Suiza aircraft engine (French patent No. 787,923). The advantage claimed for the new Birkigt process is that all of the various operations up to the machining of the outside surface are pure forging operations, and that the process therefore lends itself particularly to mass production. The novelty of the process resides in the fact that it starts with a cartridge-like shell having a head of extra thickness, the inner diameter of which is equal to the maximum inside diameter of the valve head to be formed. The shell is later reduced in diameter over its entire length below the head. Another advantage claimed for this process of producing the valve blank is that the fibers are not disturbed and that there is therefore less likelihood of the valve cracking or of fissures forming on the surfaces which are exposed to the heat of the burning gases. The patent specification also gives a list of steels that are said to be suitable for valves of this type, and this list is reproduced herewith.

The successive operations in the production of the valve blanks are illustrated by sketches 1 to 12 (reproduced from *Automobiltechnische Zeitschrift*). In describing the operations it will be assumed that the valve head is to be of 3 in. diameter and that the over-all length of the valve is to be 5.6 in. To begin with, blanks of 3-in. length are cut from 2-in. diameter bars, as shown in sketch 1. These are next upset (2) to a diameter of 2.4 in. and at the same time a conical extension 0.40 in. long and with 60-deg. taper is formed at one end, which is to serve for centering purposes in subsequent operations. In the next operation (3) a 1.6-in. punch is driven axially into the blank, but only sufficiently far to leave a head 0.92 in. thick. This operation reduces the outside diameter to about 2.2 in. and increases the length to 3.08 in. After the blank has been reheated, its shell portion is swaged down to an outside diameter of 2.08 in. while the length is increased to 4.8 in. (4). This operation does not affect the thickness of the head of the shell. Next, as indicated in sketch 5, the valve head is formed. To this end a plug is inserted in the hollow end of the blank and the head end is then



formed to shape in a die in a drop hammer. It is a good plan to forge the centering boss on the head at the same time.

Next (6) the stem portion is reduced in diameter to 1.4 in. and the total length is increased to 6 in. at the same time. In operation (7) the stem portion is reduced further, to 1.08 in., without change in length. The last two operations are preferably performed on a swaging machine, for the reason that swaging in combination with upsetting can be performed to advantage on such a machine. In this operation the valve blank is held between semi-cylindrical jaws, and during the swaging operation it is turned around its axis. At one side the jaws are made funnel-shaped, to accommodate the fillet between head and stem. Sketch 8 shows the valve blank obtained in this way, which has a mushroom-type head with a stem of 0.40 in. diameter.

(Turn to next page, please)

While machining operations might now be begun on the blank, usually another forging operation is performed, to raise a collar at either the end or the middle of the length of the stem. The dimensions of this collar are so determined that when the collar is later eliminated by pressing the material (while heated) inward, the opening in the stem is almost closed, only a small hole being left through which the cooling medium, such as sodium or mercury, can be introduced.

Compositions of Valve Steels

Carbon	0.30- 0.45	<0.50	1.00	0.2- 0.4	1.2- 1.5
Nickel	.....	25-31	....	7 - 9	0.65
Chrom.	8.5 -12	11-15	20	11.5-14	11.5-14
Silicon	>0.03	1- 2	0.5	0.65	0.65
Manganese	.....	1- 2	0.36	<0.40	<0.40
Molybdenum ...	0.7 - 1.3	....	1	0.45- 0.95	0.45- 0.95
Cobalt	.....	....	2-3	2.5- 3.5	2.5- 3.5
Tungsten	.....	2.5	....	.....	.....

Testing Methods for Petroleum Products

A number of recommendations submitted by Committee D-2 on Petroleum Products and Lubricants in its 1938 report were accepted by the American Society for Testing Materials at its annual meeting, including five new tentative standards covering a test for acid heat of gasoline, a test for unsulfonated residue of plant-spray oils, specifications for Stoddard solvent, a test for determining the ash content of petroleum oils, and a method of determining the saponification number which represents a consolidation of two present methods that are to be withdrawn. The new method is roughly indicative of the amount of unsaturated hydrocarbons in the gasoline that are reactive with sulfur in acid under the conditions of the test.

Changes which were accepted in the tentative method of test for knock characteristics of motor fuels were essentially an editorial clarification and amplification. Other revisions were made in the tests for vapor pressure of petroleum products (Reid method) and test for kinematic viscosity. Certain standards were revised; and subject to letter ballot of the Society, the tentative test for color of refined petroleum oil by means of Saybolt chronometer is to be adopted as standard. Action was taken also to approve the adoption of the existing revision of the standard tests for viscosity by means of the Saybolt viscosimeter.

A proposed method of test for determining ignition-quality characteristics of Diesel fuels and further changes in the Diesel fuel-oil classification published in 1937 are to be added to the 1938 report of the Committee, subject to confirmation by letter ballot.

There was a round-table discussion on the present state of knowledge of the oxidation of motor oils and problems arising from it. The annual dinner of Committee D-2 was held in honor of Dr. J. C. Geniesse of The Atlantic Refining Co., in recognition of his contributions in the development of testing methods for determining the kinematic viscosity and in compiling conversion tables for converting centistokes into Savbolt seconds.

Wright and Mills of the Norma-Hoffman Bearings Corp. described an accelerated test to select and grade lubricating greases for chemical stability. While most of the work reported has been done on typical ball bearing greases of the soda-base type, data are presented showing that accelerated oxidation tests may be expected to provide useful information on lime and aluminum-base greases and on gear greases. This absorption method in principle measures the rate at which oxygen is used up in oxidizing the readily oxidizable constituents in the grease sample. The sample is placed in a pressure-tight steel bomb and the test operated under fixed conditions of temperature, pressure, surface area and weight of grease sample.

Caterpillar Tractor Report

Caterpillar Tractor Co. reports July net profit $158,473 after depreciation, interest, federal income taxes, etc., comparing with $1,104,208 in July, 1937.

For seven months ended July 31, this year, net profit was $1,291,087 comparing with $7,407,083 for seven months ended July 31, 1937.

Raybestos-Manhattan Report

Financial report of Raybestos-Manhattan, Inc., for the quarter ended June 30, indicated a net loss of $43,101. Net income of $836,138 was shown for the same quarter in 1937.

For six months ended June 30, 1938, the net loss was $214,549, while for the same period in 1937 a profit was indicated of $1,510,642.

Calendar of Coming Events

CONVENTIONS AND MEETINGS

National Petroleum Association Meeting, Atlantic City, N. J.....Sept. 14-16
American Foundrymen's Association Fall Technical Conference, Ann Arbor .....Sept. 15-17
Seventh International Management Congress, Washington .....Sept. 19-23
SAE National Truck, Bus & Railcar Meeting, Chicago .....Oct. 4-5
American Society of Mechanical Engineers Meeting, Providence.....Oct. 5-7
SAE National Regional Fuel and Lubricants Meeting, Tulsa, Okla..Oct. 6-7
SAE National Aircraft Production Meeting, Los Angeles, Calif...Oct. 13-15
A.S.T.E. Annual Meeting, Pittsburgh, Oct. 14-15
American Welding Society Meeting, Detroit .....Oct. 17-21
SAE Annual Dinner, New York....Nov. 14
SAE National Transportation Engineering Meeting, New York....Nov. 14-16
National Safety Council Meeting, Chicago .....Nov. 14-18
American Petroleum Institute Meeting, Chicago .....Nov. 14-18
National Industrial Traffic League Meeting, New York .....Nov. 17-18
Automotive Service Industries Show, Chicago .....Dec. 5-10
*National Standard Parts Association Meeting, Chicago .....Dec. 2-3
SAE Annual Meeting, Detroit.....Jan. 9-13

SHOWS

20th Annual National Metal Exposition, Detroit .....Oct. 17-21
New York, National Motor Truck Show, Nov. 11-17
New York, National Automobile Show, Nov. 11-18
Pittsburgh, Pa., Automobile Show, Nov. 11-18
Detroit, Mich., Automobile Show, Nov. 11-19
Columbus, Ohio, Automobile Show, Nov. 12-18
Buffalo, N. Y., Automobile Show.Nov. 12-19
Chicago, Ill., Automobile Show.Nov. 12-19
Milwaukee, Wis., Automobile Show, Nov. 12-19
Minneapolis, Minn., Automobile Show, Nov. 12-19
*Philadelphia, Pa., Automobile Show, Nov. 12-19
*San Francisco, Calif., Automobile Show .....Nov. 12-19
Boston, Mass., Automobile Show, Nov. 12-19
Los Angeles, Calif., Automobile Show, Nov. 12-20
*St. Louis, Mo., Automobile Show, Nov. 12-20
*Elmira, N. Y., Automobile Show, Nov. 14-19
New Haven, Conn., Automobile Show, Nov. 14-19
Indianapolis, Ind., Automobile Show, Nov. 19-25
Baltimore, Md., Automobile Show, Nov. 19-26
Rochester, N. Y., Automobile Show, Nov. 19-26
Montreal, Canada, Automobile Show, Nov. 19-26
*Washington, D. C., Automobile Show, Nov. 19-26
*Cincinnati, Ohio, Automobile Show, Nov. 20-26
Newark, N. J., Automobile Show, Nov. 26-Dec .3
Denver, Colo., Automobile Show, Dec. 5-10

*Tentative

Just Among Ourselves

Ninety Per Cent Business, Ten Per Cent Art

THE new tire plant of the Ford Motor Co., the engine test house recently built for Pratt & Whitney, new buildings for the Diesel engine division of General Motors, the famous press shop of Chrysler's De Soto division, new buildings for the Glenn L. Martin Co., and the gigantic new strip mills of the Republic Steel Corp. all have these things in common: they are arresting examples of getting the most in use and beauty out of the arrangement of an industrial plant, and they were all designed and engineered by Albert Kahn.

August issue of *The Architectural Forum* is devoted mainly to Kahn, his organization, and its achievements. It is a tribute long overdue. Very little has been written to date about the man who is responsible more than anyone else for the physical appearance of Detroit's skyline.

Kahn's first job for an automobile manufacturer was a building for Packard—35 years ago, when the late Henry Joy was the big factor in the company. He has been Packard's architect ever since. Henry Ford discovered his abilities about five years later, and from then on Ford buildings began to make industrial history. He has been architect for the Chrysler Corp. since its incorporation and has had General Motors for a client on 127 important assignments. These facts alone would justify calling him "architect to the automobile industry", without recalling scores of buildings designed for parts manufacturers and other suppliers to the industry.

The Federal Trade Commission has intimated that if one organization controls 10 per cent of the business in an industry, it may have the characteristics of a monopoly. In 1937 the Kahn organization is said to have designed 19 per cent of all industrial building handled by architects. I do not believe that even the most rabid "witch hunter" in Washington would worry about this kind of monopoly.

The "incorporated" part of Albert Kahn sometimes includes as many as 400 people, engineers, designers, architects, expeditors, etc. The administrative part of the business is shared with brothers Moritz and Louis, and the administrative function is extremely important when you consider there may be 20 to 40 big jobs going through the organization at one time.

The automobile industry fostered and nourished mass production techniques. Generally speaking, the buildings which have made such techniques economically applicable have been created by Albert Kahn. The automobile industry brought to him its physical problem incidental to mass production, and he brought mass production to architecture. It has been a very happy exchange of services.

Says *The Architectural Forum*: "The outstanding fact about the organization of Albert Kahn, Inc., is its completeness. The departments of the technical division design the entire construction, including mechanical work. All departments start work simultaneously instead of working in successive stages, and this, in addition to speeding up the work of making the drawings, means that plans and specifications for all trades can be submitted for bids at one time, thus enabling the client to determine the cost of the building in its entirety before starting to build. With this procedure, the drawings for a large factory can be completed in a week or ten days' time."

A good many members of the organization are grizzled veterans. They set a pace that would wear out many a younger organization that might be inclined to brag of its youth and vitality.

The Kahn office has handled two of the biggest commissions in the history of architecture as a profession. During the World War all U. S. government aviation construction work was cleared through it. Following the war a Soviet Commission came to the United States with grandiose plans for more than $2,000,000,000 worth of industrial construction as part of the first five-year plan. Kahn took on the assignment and went through with it in the face of difficulties such as no architect has faced before or since.

Completion of the task found Kahn one of the Russian national heroes, although he is German-born, and a citizen of the United States. About a year ago, in a conversation with the present writer he told of going to an obscure Russian photographer and having his picture taken for presentation to some of his Russian friends who had asked for it. When he learned Kahn's name, the Russian photographer refused to take a cent for the task and surpassed himself on the job.

Kahn's work is almost unknown to the American public, although many communities are unconsciously grateful to him for having made their industrial buildings assets instead of eyesores.

And this, gentlemen, is the accomplishment of a man who insists that architecture is 90 per cent business and 10 per cent art.—

HERBERT HOSKING

THE CHILTON ROUND TABLE

In order to give readers of AUTOMOTIVE INDUSTRIES a clue to certain merchandising and service aspects of the automotive industry which are normally outside the scope of an industrial publication, we present herewith excerpts from the August issues of the four other magazines published by the Automotive Division of the Chilton Co.

From COMMERCIAL CAR JOURNAL

Taking a leaf from the hook and ladder book, a trailer company is staging demonstrations with an automatically steering semi-trailer. The idea is to facilitate turning for long trailers and to make it easier for normal length trailers to make deliveries in narrow streets and alleys. Not only is the steering automatic but also the coupling of the controls. With the proper coupling device the driver can back up, engage the trailer, lift the landing gear, release the brakes and connect the automatic steering linkage without leaving the cab.

From MOTOR WORLD WHOLESALE

No jobber salesman can gain recognition as an authority as long as he leans heavily upon the manufacturer's representative to do his field work. The jobber's salesman who uses the manufacturer's representative as a crutch, is in reality, a "territorial cripple."

From AUTOMOBILE TRADE JOURNAL

Word reaches us from across the big pond, that Tazio "Excuse my dust" Nuvolari, great and game little racing driver, is about to retire. Rumors say that he is to become director of Alfa Romeo racing activities. Disappointment in the new Alfa-Romeos and injuries received early this year are the basis for the retirement rumors. Still, many who know the little Italian keep their fingers crossed, for while the gossip was flying about, Mr. Nuvolari was practicing for the coming German Grand Prix.

From MOTOR AGE

Keeping the car owner satisfied with prompt and effective service

(Turn to page 240, please)

Electroplating

18 Automotive Materials

BY JOSEPH GESCHELIN

ALTHOUGH the thickness of good electroplated coatings is microscopic, the total area of automotive parts so treated is of astronomical proportions, relatively speaking. It's quite amazing to find how much tonnage of certain metals used for this purpose is consumed in a good model-year.

Consider such tonnage figures for 1937 when the industry produced about 5 million cars and trucks in the U. S. and Canada. Electro-deposited coatings accounted for approximately 4 million pounds of nickel—2 million pounds of copper—1 million pounds of cadmium and zinc (combined). All industry consumed, in 1937, a total of 13 million pounds of nickel.

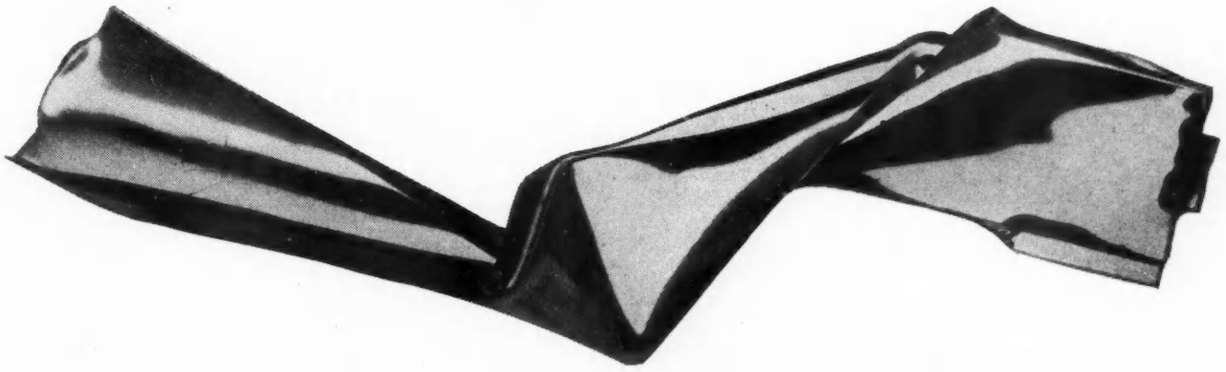
Nor does this tell the whole story. One of the important automobile producers has a total potential electroplating generator capacity of 1,250,000 amp. Estimated cost of equipment per generator-ampere is around $1.25; estimated cost of accessory equipment around $1 per generator-ampere. This places the investment in electroplating equipment at a grand total of about $2,812,500 for one organization.

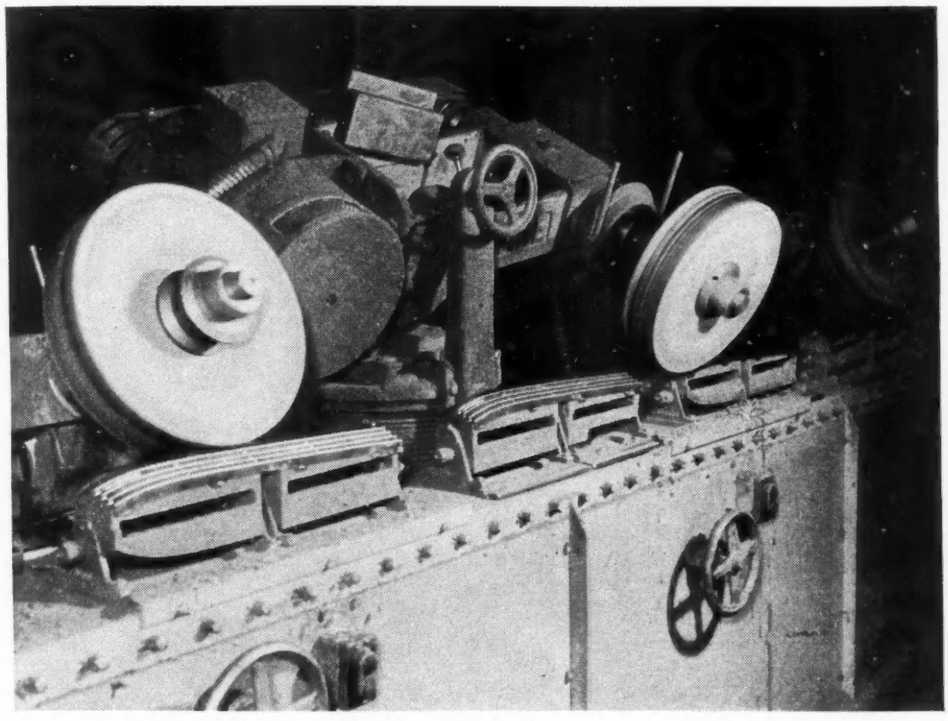
Before entering the more formal phases of this discussion, we direct attention to the fact that decorative finish is but the visible manifestation of one of the electro-deposited coatings used in the automobile. There are many hidden details in which coatings play an even more important role, contributing to mechanical excellence and durability. Mechanization, precise controls, and research have done much to place the art of electroplating on a commercial plane with control qualities similar to those of machine shop practice.

Among the current developments in electroplating are bright nickel—which may be classed as a distinctly quality coating; bright zinc; bright tin, and other bright coatings which will be described more fully later on. Equipment has accounted for considerable progress with refinements in plating conveyors, and special machines for the different types of coatings.

Research in recent years has demonstrated ably that the quality of the base material exerts a controlling effect on the qualities of the coating. This has become so well recognized as a basic principle that in most organizations the steel intended for plating is specially selected for that purpose.

In addition to the quality of the base metal there is the requirement of a chemically clean surface. This one detail alone encompassed research, equipment, cleaning chemicals, and process that deserve separate treatment. The selection of base materials and their preparation im-





Illustrating the deformation of bright nickel plated steel strip without injury to the nickel coating. Plating is 0.001 in. thick, applied on both sides of steel strip 0.0157 in. thick, in Hanson-Van Winkle-Munning process

Close-up of one of the stations on the huge Divine Bros. automatic polishing machines installed at Pontiac

g for Automobiles

used 3500 tons of coating metals in 1937. Over 30 per cent of total nickel consumption found its way to automotive assembly lines

mediately before plating are considerations that have as much bearing on good coatings as any other element.

Our purpose here is to discuss exclusively the basic metals currently used in electroplating processes. Certain chemicals used in electroplating are so closely related to these metals that we have appended a table of the principal materials of this type, although none of these have been given attention in the text.

To give this article coherent form, we have divided the subject into three sections. Section One discusses a comprehensive classification of plated finishes. Section Two is devoted to current developments in coatings, including a discussion of commercial specifications. Section Three high-spots the commercially available metal anodes with notes on proprietary materials.

Section One

Classification of Electroplated Coatings

For the automotive field, the plated coatings may be grouped in four major classifications:

1. Decorative
2. Protective
3. Functional
4. Salvage

Although the first three constitute the major applications, the fourth, salvage, while minor with respect to the tonnage of plating materials used, is nevertheless of importance from a commercial viewpoint. Let us consider these classifications in detail.

1. Decorative—This is intended to comprehend all coatings on exposed parts both on the exterior and interior of a vehicle where eye-appeal is essential to the styling and art treatment. Regardless of the nature of the parts so treated, the finish is predominantly chromium plate.

Among the parts that feature decorative treatment are the following:

a. *Steel* parts—bumpers, radiator guards, radiator grilles die cast or stamped, wheel trim rings, etc.

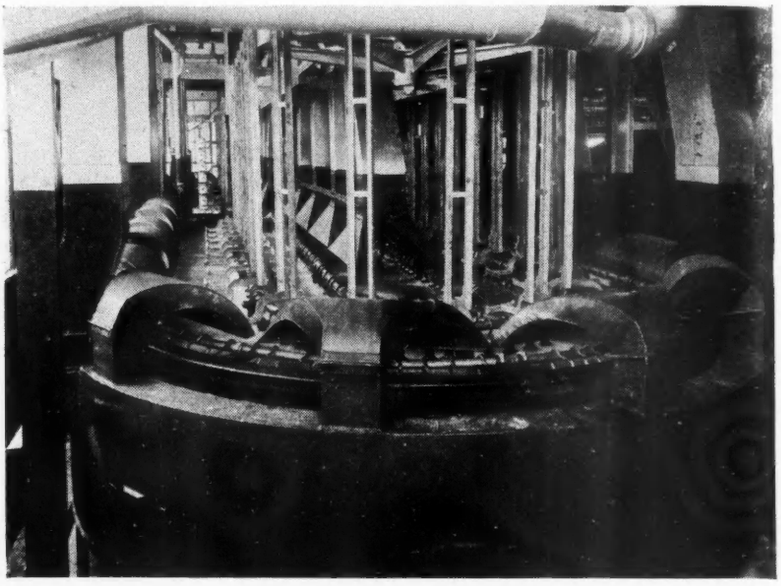
b. *Brass or copper*—headlamp elements, hub cap discs, etc.

c. *Zinc* alloy die castings; zinc alloy rolled or cast forms—ornaments both interior and exterior, door handles, other die cast details such as escutcheons, radiator grilles, body belt moldings, edge moldings for running boards and body sides.

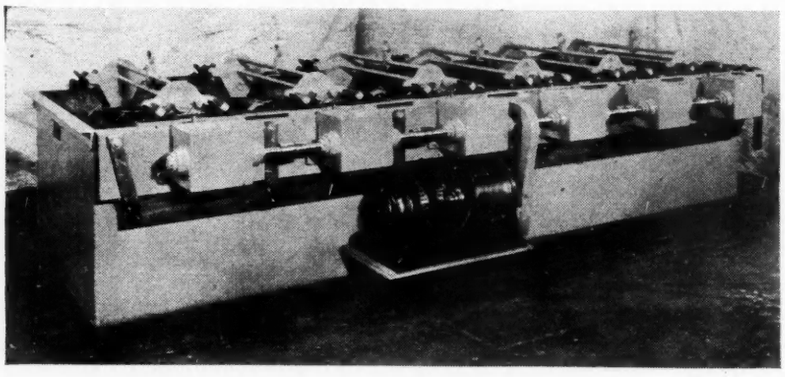
2. Protective—This covers the coatings imparting corrosion-resistance to many exterior and interior parts. It is one of the hidden details contributing much to the quality of the motor car.

Coatings commonly used for this purpose are Cadmium and Bright Zinc. Among the parts so treated are —bolts, nuts, accessory parts, and all manner of fittings subject to corrosion but not requiring a decorative finish.

3. Functional—We feel that the following brief comments may lead to a better appreciation of how electroplated coatings may be utilized to develop special properties such as



View showing plating tank of Meaker return type full automatic plating machine recently installed in prominent plant for tin-plating of pistons



This is an example of one of the new Crown multiple barrel plating units, self-contained and with single motor drive

List of Principal Suppliers of Electroplating Materials

American Brass Co.
American Platinum Works
Apothecaries Hall
Belmont Smelting & Refining Works
Bridgeport Brass Co.
Calcine Chemical Co.
Crown Rheostat & Supply Co.
Thomas J. Dee & Co.
Division Lead Co.
E. I. du Pont de Nemours & Co.
Handy & Harman
Hanson-Van Winkle-Munning Co.
Harshaw Chemical Co.
D. E. Makepeace Co.
Meaker Co.
McGean Chemical Co.
Revere Copper & Brass Co.
Seymour Co.
Frederic B. Stevens, Inc.
Udylite Co.
U. S. Galvanizing & Plating Equip. Corp.
United Wire & Supply Corp.

self-lubrication, resistance to scuffing during initial break-in, anti-weld property, etc.

a. Headlamp reflectors—silver plated to provide maximum reflectivity and an adequate measure of protection against tarnish. Current research has been directed to the utilization of precious metals such as rhodium and palladium to replace silver. However, there seems to be no commercial substitute for silver at the moment.

b. Pistons, pins, piston rings, knuckle bolts, brake parts, etc.—coated with Cadmium or Tin to provide anti-scuffing wearing surfaces. Coincident with the growing use of special coatings on piston rings used in regular production, one of the prominent manufacturers has announced a standard ring with an electrodeposited coating of Tin.

c. Cylinder walls, piston rings, pistons, stressed pins—chromium plated to provide a dense, hard, wear-resistant and corrosion-resistant surface. Outboard motors for racing purposes have featured chromium plating on pistons and cylinders for some years and much effort has been directed, experimentally, to the chromium plating of motor car engine cylinder walls. Crankshafts have been chromium plated experimentally for production, and rather commonly as a salvage operation. One of the piston rings in the Graham-Paige ring assembly is chromium plated.

d. Gearing—One of the functional coatings is Lubri-Cote, a patented process developed by The Timken-Detroit Axle Co. This consists in copper-plating the heavy-duty rear axle gears, applying a coating of less than 0.001 in. It provides an anti-weld, scuff-resistant gear surface which eliminates the need for special lubricants having E-P properties.

e. Engine Bearings — Latest development is the deposition of Indium on the surface of cadmium-silver-copper engine bearings to eliminate corrosion due to lubricating oil acidity.

f. Copper plating on certain parts requiring differential heat treatment; e.g., parts such as camshafts and gears where certain portions are to be case-carburized or hardened while other critical sections must remain unchanged. Copper serves as an excellent masking material for this purpose.

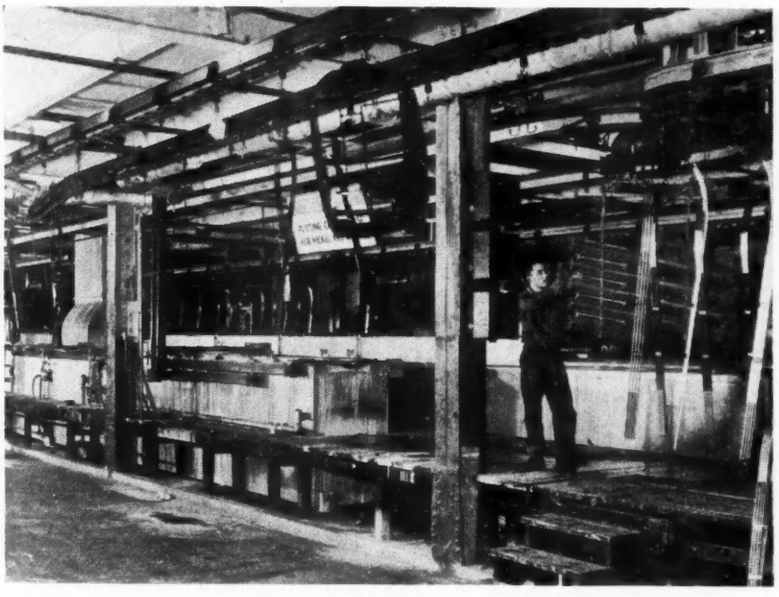
g. Another functional coating is that of plating Brass on metal parts intended for rubber-to-metal bonding. The steel must be of selected stock suitable for the purpose, chemically cleaned.

h. Distinctive functional coating is—tin—a deposit produced in the Bullard-Dunn Process. The process is used to remove scale from gears and shafts after heat treatment, eliminating the usual sandblasting. The tin coating increases shelf life of treated parts by retarding atmospheric corrosion.

4. Salvage—One of the most valuable of the commercial applications of thick ductile coatings of chromium plate, it has become an important "putting-on" tool in the largest

Electroplating Chemicals

Ammonium carbonate, chloride, sulfide, sulphate, sulpho-cyanide
Antimony sulfide
Cobalt chloride, sulphate
Copper, acetate, carbonate, chloride, cyanide, nitrate, sulphate
Cleaner, alkali type for detergents
Cleaner, soap type
Cleaner, and lubricants
Potassium salts—all types
Sodium salts—all types
Cadmium, chloride, oxide, sulphate
Cadmium, brightener
Chromium, tin, oxide, carbonate, sulphate
Lead, acetate, carbonate
Gold, chloride, cyanide
Silver, chloride, cyanide, nitrate
Nickel, carbonate, fluoride, sulphate, single and double, black nickel salts, brighteners
Tin, chloride, cyanide, stannate
Zinc, carbonate, cyanide, oxide, chloride, sulphate, brightener



View of part of electroplating department at Pontiac. Equipment is of semi-automatic type

Suppliers and Producers of Electroplating

The UDYLITE CO. specializes in the manufacture of ball-type anodes which are available for any alkaline or cyanide plating solution such as cadmium, zinc, copper, brass, and tin. Ball anodes are not yet available for acid plating solutions such as nickel, acid copper, acid tin, acid zinc. For these solutions slab and oval anodes are used.

The company supplies the following line of anodes:

Nickel

99 per cent plus, special pressure cast (carbon type)

99 per cent plus, rolled depolarized (oxide type)

99 per cent plus, cast depolarized (oxide type)

99 per cent plus, cast electronized (carbon type)

98/97 per cent special cast .

Copper

99.9 per cent pure electrolytic copper —rolled, cast and electrolytic sheet

Tin

Pure straits tin—cast only

Zinc

99.9 per cent electroytic zinc—cast only

Lead

Pure and antimonial lead sheet—flats or shapes

HANSON-VAN WINKLE-MUNNING produces the following anodes:

Depolarized nickel of 99.7 per cent purity, rolled type

Cast nickel (carbon type), 99 per cent purity

Cast nickel (oxide or depolarized), 95/97 per cent purity

Cobalt nickel (carbon type), 99.6 per cent purity, elliptical form

Copper, 99.9 per cent purity, rolled, cast, electrolytic sheet

Brass, elliptic form

Mazic process, Z-A-M anodes

Lead, tin

Silver in various forms including pure silver, 99.9 per cent purity

Gold of any desired purity

THE MEAKER CO.—Zinc anodes, 99.9 per cent purity, in variety of sizes from 12 in. to 60 in., also curved forms for barrel plating.

CROWN RHEOSTAT AND SUPPLY CO.:

Seymour nickel anodes

Nickel anodes—rolled, depolarized, elliptic form, 99 per cent purity

Cast oxide depolarized, 99 per cent

Cast carbon type, 99 per cent

Sand cast, 95/97 per cent

Zinc, lead, tin

Gold, silver

Special corrugated anodes for Crown rotary barrels

Copper, rolled, cast, electrolytic, 99.9 per cent purity

Brass and bronze, cast flat or oval

plants in the automotive industry for salvaging undersize but otherwise perfectly good processed parts. In the service field, among large fleet operators, chromium plating has been used as a means of saving many major parts from a premature end on the scrap heap. This has been done successfully on crankshafts, axles, spindles, cylinder walls, and other parts where replacement cost is sufficiently high to warrant the expense of salvage procedure.

Section Two

Specifications; Special Coatings

Bright Nickel plating saw its commercial beginnings only a few years ago and today is penetrating the most important plants in the automotive industry.

It is based on patents held by various commercial organizations. Among the most prominent names in this field are—Hanson-Van Winkle-Munning, McGean Chemical Co., Harshaw Chemical Co., and Udylite. Some notes on this process contributed by two of these companies are given below.

The Udylite Company estimates that savings of from 25 to 50 per cent can be effected in the finishing of metal parts through the use of the Udylite Process. Many advantages are claimed for this coating:

1. Elimination of most, if not all, buffing, tumbling, and coloring operations.

2. Elimination of copper buffing before nickel plating. Udylite Bright Nickel can be applied directly over smooth copper deposits.

3. Bright nickel deposits are secured in deep inaccessible recesses. Thus many die castings and brass and steel parts of irregular shape may be finished more economically.

4. Many inexpensive articles may be given an attractive bright nickel coating with no buffing, polishing, or tumbling of the base metal or nickel coating.

5. No nickel is lost by buffing and no nickel is removed from high points where wear is most likely to occur.

6. Chromium has better throwing power over bright nickel than overbuffed, dull nickel, making for simpler and cheaper racks and less rack maintenance.

7. Parts plated on wire or certain simple racks may be taken directly from the nickel to the chromium plating bath without buffing, handling, or re-racking.

The Udylite plating solution is said to be a stable, easily-controlled bath having excellent throwing power, operating efficiency of 98-99 per cent. Highly lustrous nickel deposits are said to be obtained over a wide range of conditions with this solution.

The Hanson-Van Winkle-Munning bright nickel plating process is said to produce blue white deposits which closely approach chromium in color and have a mirror-like brightness when applied to a well polished surface such as steel or brass. An outstanding feature of the deposits is their ductility. In addition, the deposits from this solution can be plated directly on steel and are nonpitting. The high current densities possible with this bright nickel solution make it advantageous in large scale production where plating space is limited.

All the components of this solution can be readily analyzed by simple methods, insuring a continuity of production and uniform results. The brighteners in this process are said to be simple chemicals, the concentration of which can easily be determined and controlled.

A feature of the H-VW-M process is the presence of cobalt in the solution, automatically provided by cast cobalt nickel anodes, producing a bluish-white deposit. In addition, cobalt has an important effect on the grain structure of the deposited alloy.

Because of the great variety of zinc alloy die cast parts used in the automotive industry, it is of interest to have an authoritative statement as to the most economical methods

Chemicals, Anodes and Equipment

FREDERIC B. STEVENS, INC.:

Nickel anodes—Cast Besplate oval, purity 99 per cent plus

Rolled depolarized, purity 99 per cent plus

Rolled annealed, 99 per cent plus

Sand cast, 95/97 per cent

Cast nickel, 90/92 per cent

Copper, cast, rolled, electrolytic sheet, purity 99.9 per cent

Tin, cast oval standard

Cast zinc, standard forms and sizes

Brass, cast oval or flat, rolled oval or flat Silver, sheet form, 99.9 fine

HANDY & HARMAN—Supplies 999 "Plus" fine silver anodes to the industry, stressing the requirements of high fineness, good grain structure, and correct physical properties. They emphasize the need for uniformity of quality through the elimination of certain impurities which may be present in silvers of even highest fineness.

THOMAS J. DEE & CO.—Supplies gold and silver anodes; silver chloride, silver nitrate, silver cyanide, for electroplating purposes.

REVERE COPPER AND BRASS, INC.—Supplies anodes and hooks of the following materials:

Flat untrimmed copper anodes

Oval copper anodes

Electro-deposited copper anodes

Flat brass anodes

Anode hook—S-type and hook type

THE AMERICAN BRASS CO.—Producers of anodes of copper, brass, and bronze, chiefly of oval form. Rolled copper anodes are of over 99.925 per cent purity. Sheet anodes of same materials are rolled to thickness and supplied in any desired size. Oval copper anodes are produced in a variety of standard sizes. Electrolytic copper anodes, sometimes called "cathode anodes" are produced with 99.99 per cent purity.

E. I. DU PONT DE NEMOURS & CO.—Produces a variety of plating salts, cyanides, alkalies, solvents, bright dips, brightening agents, acids and inhibitors, and miscellaneous chemicals for the electroplating industry. The following anodes are supplied in a wide range of types and sizes:

Zin-O-Lyte, for use with the Zin-O-Lyte bath

Purozinc, high purity zinc anodes for Duozinc and du Pont bright zinc solutions

Zinc, in various grades including electrolytic

Duozinc, an alloy of zinc with ½ to 2 per cent mercury

PUR-o-TIN, cast from super-refined tin, testing 99.99 per cent

Cadmium, bar type in variety of shapes and sizes, 99.9 per cent

Nickel, rolled depolarized 99 per cent plus purity, cast, electrolytic, and other grades

Lead, anodes for chromium plating with lead covered copper hooks, made to specifications

Copper—brass—lead—tin, standard sizes and shapes

of producing quality coatings. The following recommendation is quoted from a contribution made by the research department of The New Jersey Zinc Co.:

"In general, there are two types of coatings applied to zinc alloy die castings. For relatively mild indoor use a coating of about 0.0003 in. of nickel applied directly on the zinc alloy die casting is common. For more severe use indoors and for outdoor service, copper-nickel coatings of a minimum thickness of the copper in this sequence is stated as 0.0002 in. to 0.0003 in. Combined thickness of copper-nickel is from 0.00075 to 0.001 in.

"Direct nickel plating is accomplished in the following solution:

Nickel sulfate	10 to 15 oz. per gal.
Anhydrous sodium sulfate	10 to 15 oz. per gal.
Ammonium chloride	2 to 3 oz. per gal.
Boric acid	2 oz. per gal.

"This solution is operated in the broad pH range 4.9 to 5.7. In general, the pH should be in the lower side when the nickel content of the solution is at its highest, the bath temperature corresponding to the higher nickel content. Current densities range from 12 to 36 amp. per sq. ft.

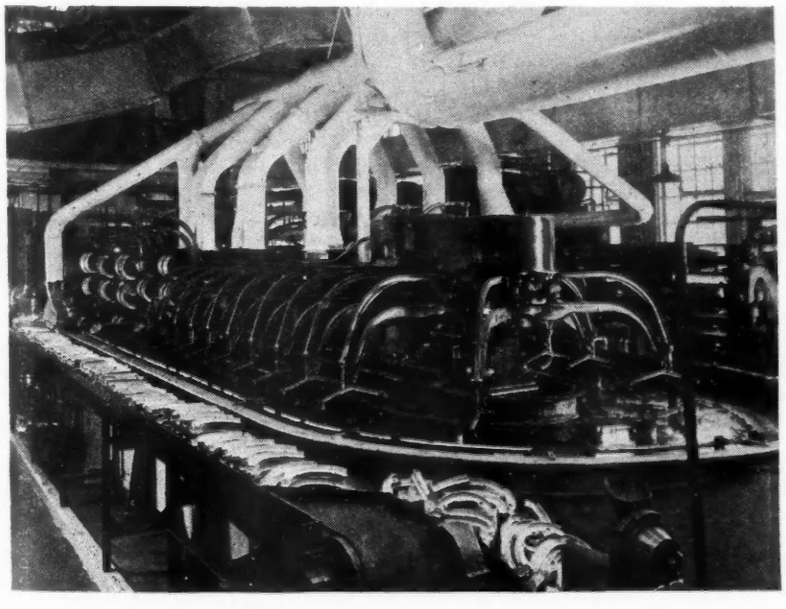
"The Rochelle copper plating solution commercially used has the following general formula:

Copper cyanide	2 to 3.5 oz. per gal.
Sodium cyanide	2.7 to 4.2 oz. per gal.
Rochelle salt	2 to 8 oz. per gal.
Sodium carbonate	2 to 4 oz. per gal.

"For the deposition of the final nickel coating over the copper deposit most platers use proprietary bright nickel solutions. A few platers, however, employ the older Watts nickel solution which produces deposits requiring color cuffing for brightness.

"Chromium is customarily deposited from the same solutions and with the same technique as are used in the plating of other materials."

Early this year announcement was made of a new process for the production of cadmium alloy engine bearings which would resist the attack of engine oil acidity. A complete description of the process, including the details of electroplating with indium as developed by C. F.



Close-up of installation of Stevens automatic plating conveyor in prominent automobile plant, plating brake shoes

Smart, will be found in AUTOMOTIVE INDUSTRIES, March 19, 1938, page 421.

Another development is the improved Meaker Process for galvanizing round wire, using the Meaker pure zinc anode. The process permits the formation of heavy coatings applied at high current densities. It is claimed that the Meaker coating will not peel or flake when the wire is bent, twisted, or wrapped about its own diameter.

More recent developments include duPont bright zinc; Cadalyte "38," duPont improved cadmium plating salt, and duPont Cadalyte maintenance compound. Zin-O-Lyte, another duPont process recently announced, is a process for bright Zinc plating which produces brilliant deposits direct from the bath without bright dipping. It operates with equal success in still plating or in barrel plating, and is applicable to almost all types of iron and steel products except some kinds of castings, according to the manufacturer.

The duPont process of electrotinning, using the sodium-stannate sodium acetate bath, has been in use for a considerable number of years.

At the annual meeting of the

Table 1

Recommended Thickness Electrodeposited Coatings (on steel)

Coating	Mild Service (thickness)	General Service (thickness)
Zinc (min.)	0.00015 in.	0.0005 in.
Cadmium (min.)	0.00015 in.	0.0005 in.
Chromium (average over nickel)	0.00002 in.	0.00002 in.
Copper plus nickel (min.)	0.0004 in.	0.00075 in.
Nickel (final, min., over copper)	0.0002 in.	0.0004 in.

Automotive Materials

Improvements Made in Parkerizing Process

A number of improvements in Parkerizing, a finishing and rustproofing process, were announced a short time ago by the Parker Rust-Proof Co. Among the more important of these is the matter of processing time. Instead of the 60 to 90 min. required to apply the older process the time has been reduced to 30 min. Operating temperature also has been reduced, the new processing solution reacting at 180 deg. Fahr. instead of 210 deg. Fahr. formerly found necessary.

Improved liquid chemicals are said to develop less sludge in the processing tank and to produce a finer-grained, smoother coating. Advantages accruing from this particular improvement are less change in metal contour and a minimum of build-up in fine threads. This is especially important on screw machine products, or articles on which close tolerances must be maintained. Size and cost of processing tanks required to handle the volume of work also are reduced by the shortened processing time.

Welding Electrode With Tungsten Molybdenum Base

A welding electrode with tungsten molybdenum base for making tool steel cutting edges on medium carbon steel or for rebuilding worn tools and dies is a new development of the Harnischfeger Corp., Milwaukee. The electrode's deposited metal is said to equal in composition and in property the highest grade of high-speed tool steels commercially available. According to the manufacturer, it has extreme air hardening properties which, without treatment, give hardness values in excess of 60 Rockwell C.

Although it is now intended as a substitute for the cemented carbide tool insert, tool points of high hardness can be built up on medium carbon steel bars prepared in the same manner as those used to support tungsten carbide tips. Its use is also recommended where excessive wear and high initial hardness are required. In procedure it is used with the work negative and the electrode positive and is available in sizes from 3/32 in. up to ¼ in. in diameter for use with currents ranging from 30 to 265 amp.

Synthetic Hard Metal Carbide

Four patents were recently issued to Philip M. McKenna, Latrobe, Pa., on a new compound of tungsten, titanium and carbon. Main use of the composition at present is as an ingredient in the manufacture of hard carbide alloys for steel-cutting tools.

Steel of a hardness of 67 Rockwell

American Electroplaters' Society held in June, Floyd Oplinger, technical director, electroplating materials division, E. I. duPont de Nemours & Co., announced the development of a new so-called "white brass" coating with a composition of about 28 per cent copper, 72 per cent zinc.

The bath and process, which are covered by patents, produce a fine-grain coating which closely resembles chromium. Brighteners may be used in the bath. It is suitable for decorative finish when not exposed outside; outdoor exposure results in a tarnish which may be washed off.

The bath is of the zinc-cyanide type and is said to be easily prepared and controlled. Plating is at high temperature with high current density. Recessed surfaces present no difficulty.

To give some idea of the limiting thickness of *quality* coatings, we reproduce in Table 1 recommendations taken from the "Tentative Specifications for Electrodeposited Coatings of Zinc, Cadmium, Nickel, and Chromium on Steel," a publication issued jointly by the American Electro-Platers' Society and the American Society for Testing Materials.

Current publication was issued in 1935 but we understand that its recommendations remain unchanged.

Section Three

Metal Anodes

Currently the following metals are in general use:

A—Nickel, brass, copper, cadmium, zinc, lead, cobalt, nickel-cobalt, silver.

B—Tin, indium, zn-al-hg.

C (rare)—Gold, tungsten, rhodium, palladium, carbon.

The foregoing have been arranged in groups in descending order of usage, the first group, nickel to zinc inclusive, accounting for most of the tonnage. It may be noted in this connection that all common baths in current use, with exception of chromium, use soluble anodes, generally of high-purity metal.

According to Hanson-Van Winkle-Munning, the requisites of a good anode are:

1. Correct crystal structure which permits ready, even and uniform corrosion.

2. Freedom from harmful impurities, such as zinc or copper in nickel anodes; arsenic in copper; lead in zinc and cadmium, etc.

3. Form which provides the maximum of active anode surface per pound and which results in a minimum of final scrap.

To complete the picture of commercial anodes we shall cover briefly the specifications of proprietary anodes as supplied by many well known organizations. For those interested, we have appended a list of the principal suppliers and/or producers of anodes and chemicals. (See pages 230 and 231.) It may be noted that some of these also make or supply machines and accessory equipment for electroplating.

NEW DEVELOPMENTS

C has been turned out with this compound, it is said, although its greatest use appears to be in machining steel heat-treated from 250 to 500 Brinell. The speed of cutting is claimed to be two to six times that of high-speed steel tools on similar work.

Both rough and finish machining of steel such as SAE 1045, SAE 1020 to 1095, SAE T1340, SAE 3140, SAE 52100, and stainless steels, can be done with tools tipped with the new compound.

Aluminum Coatings For Steel Parts

Considerable interest has developed in Germany recently in the use of aluminum coatings to protect steel articles against corrosion. There are essentially six different methods of applying aluminum to steel.

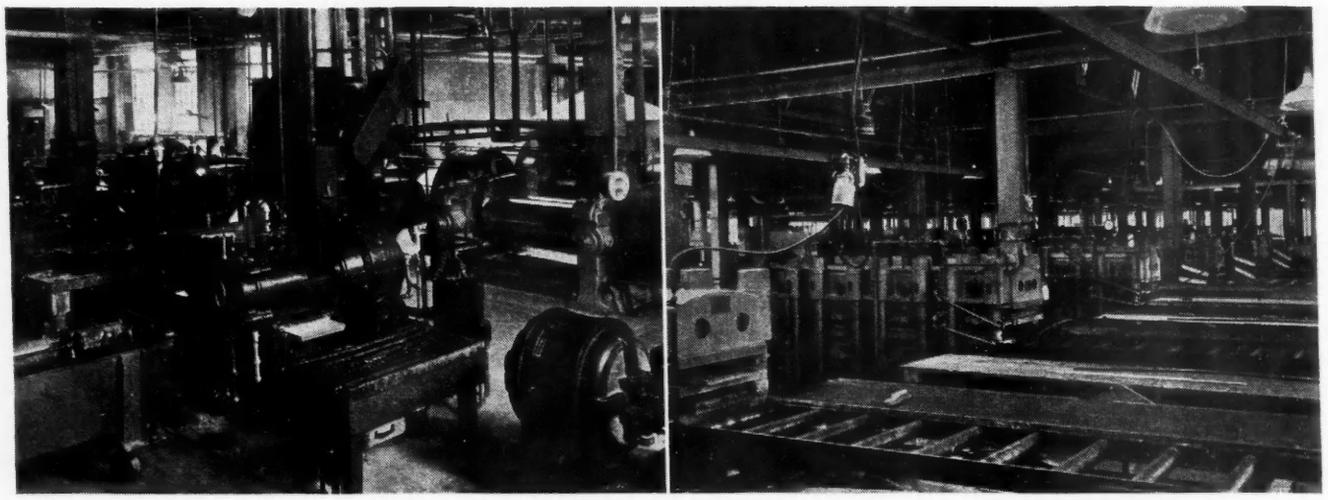
The well-known Schoop metal-spraying process is applicable to this purpose, the molten aluminum being sprayed against the surfaces of steel objects by means of compressed air. This process prevents scaling of the steel, because at high temperatures an iron-aluminum alloy is formed which is resistant to scaling up to temperatures of 1800 deg. Fahr., depending on the thickness of the layer.

Probably the most important process is that of close-plating, by which aluminum foil is applied to sheet and strip steel by rolling at between 600 and 700 deg. Fahr. Cold plating also is in use. The trouble formerly encountered from the formation of $Fe\ Al_3$ when aluminum-plated sheets were annealed to render them suitable for deep-drawing operations, has been overcome by the use of special grades of steel.

Coating of steel articles by dipping them in a bath of molten aluminum, similar to dipping in molten zinc in hot galvanizing, calls for very careful preparation of the surfaces of the base metal. According to one process, all traces of oxide are first removed from the surfaces of the articles, which are then transferred directly to the aluminum bath without allowing them to come in contact with the air, protective atmospheres of hydrogen or illuminating gas being used. The need for these protective atmospheres is a disadvantage of this process. In another process the steel parts are pickled in a dilute solution of hydrochloric acid and are then passed at 1100 deg. Fahr. through a bath of fused boric acid, the last traces of oxide being eliminated by annealing at 1650-1830 degs. Fahr. in a current of hydrogen, before the parts enter the aluminum bath. A third process provides for preliminary cleaning in an acid bath and final cleaning in a bath of ammonium chloride located in the annealing oven. From the chloride bath the parts pass through a layer of solid reducing medium floating on top of the aluminum bath, into the latter.

In the calorizing process the steel parts, after having been subjected to a preliminary cleaning process, are packed in a steel drum, together with a mixture of aluminum powder, sal ammoniac, and kaolin, and heated to 1550-1650 deg. Fahr.; or else they are maintained at a high temperature in iron annealing boxes while packed in this mixture.

Another process known as "alitir-



MODERN manufacturing technique in the plant of the Dryden Rubber Co., Chicago, utilizes the equipment shown in the accompanying photographs to produce dense rubber window channel and other strips for passenger car and truck bodies. First step in the process is pictured at the right. The compounded rubber is softened on a mill, then shaped into sections by a tubing machine. These operations are mechanized by a conveyor which joins the two steps, automatically removing the rubber from the mill rolls and feeding it into the tube machine.

The process is continuous, the first two operations being joined to the third step in which the formed sections as they issue from the tubing machines are cured into the shape of the final product in the machines shown below, said to be the longest of their type in the rubber industry.

Just prior to this operation, inspectors make the second control test to make certain that the rubber contains the ingredients essential to optimum quality.

Cured sections coming from the machines shown in the illustration below, continue through trimming machines which remove excess overflow, then through a third control inspection. Final operation is that of splicing the formed part into a continuous unit in splicing machines. The ends are joined and locally vulcanized in special fixtures. A final control operation, inspection of the splice for strength and smoothness, completes the process. The entire process from the compounding room to the shipping room requires only a few hours.

ing" consists in packing the cleaned steel articles in a powdered alloy of iron and aluminum containing between 40 and 50 per cent of iron, and heating them to between 1675 and 1825 degs. Fahr. Under these conditions the aluminum gradually diffuses into the steel surface.

Electro-plating processes also are available, but are rather expensive for practical purposes. Aqueous electrolytes are out of the question, and only electrolytes in the fused state, such as aluminum chloride, can be considered. Galvanic coatings can be deposited from these electrolytes at temperatures ranging between 200 and 750 degs. Fahr. Complex organic chlorides of aluminum, dissolved in organic solvents, also can be made use of in aluminum plating, if every trace of water is carefully eliminated.

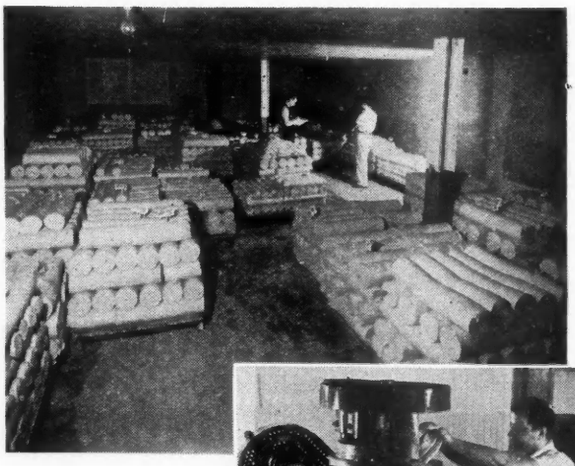
The protection against corrosion afforded by coatings of aluminum is quite effective, because aluminum when exposed to the atmosphere oxidizes much less rapidly than tin, zinc, or lead. A thin and very adhesive layer of oxide forms rapidly on aluminum, and this coating protests the metallic aluminum beneath from further atmospheric attack.—ATZ, June 25.

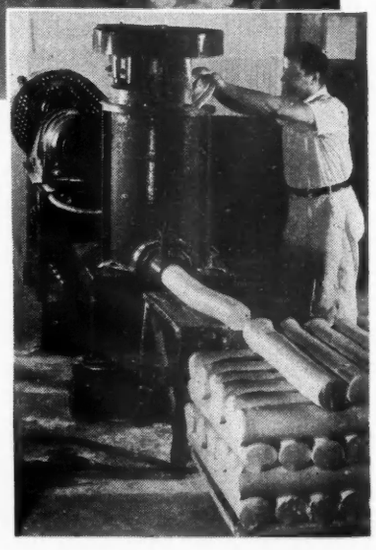
New Compound Facilitates Cleaning After Welding

A compound named "Spatter Film" which is claimed to reduce cleaning time after welding by 20 to 60 per cent has been brought out by the Lincoln Electric Co., Cleveland. The substance reduces the tendency of spatter to adhere tightly, thus facilitating its removal.

It is soluble in water, is non-inflammable and contains no free alkali to injure the hands or paints. Only an amount of the film sufficient to cover the work adjacent to the seam or joint need be applied. A gallon of "Spatter Film" will cover approximately 50,000 sq. in. It can be removed for painting by wiping with a cloth, if still wet, or by washing with water if dry.

SPARK PLUG insulators are made from the large, smooth white rolls of raw unformed "Ziramic" dough pictured herewith in a vault and one stage of machine processing at the plant of the Electric Auto-Lite Co. Deep concrete vaults such as the one shown above are used to store and "age" the dough. During the aging, which requires from 8 to 12 days, the dough undergoes a bacterio-chemical action which is said to add to the service life of the completed spark plug insulator. The machine pictured at the right is employed in one of the first steps of the production process.





Twenty Years of Decentralization

by the Ford Motor Co. has brought out many important social changes

By W. J. CAMERON*

DECENTRALIZATION is no new thing, even in industry, where it is more talked about than practiced. The Ford Motor Company has been experimenting with decentralization for 20 years.

This is not a criticism of industry in general; rather is it a suggestion that the universal significance of decentralization and its possible practical application to industry have not been generally studied and, therefore, generally speaking, are not rightly understood.

Yet a little serious reflection reveals that it is but the inevitable correlative of a force as constant as life itself—a complementary part of the universal rhythm by which all movement is governed—ebb and flow, concentration and diffusion, mobilization and dispersion, accumulating and expending, gathering and scattering, and (this is important) with the centralizing principle always coming first. Indeed, the very etymology of the word *decentralization* presupposes a necessarily previous centralizing. And these natural complementary or compensatory movements govern not only life but human progress, as the diastolic and systolic action of heart and arteries governs the blood's circulation.

People Forced from the Cities

So far as human progress is concerned, we seem at present to be in a systolic period—a period of contraction, in which our own people are being forced back to village and farm from the crowded cities, and foreigners in great numbers back to the lands of their birth. In the last few years the self-decentralizing of our own populations has been enormous and continuous. Because we are busy with other matters, either this great shifting of populations—far less a sentimental "back-to-the-land" movement than a sternly necessitous away-from-the-cities movement—has escaped general observation, or its meaning has been lost on most of those who marked it.

It is not (and this is important, too) a purposeless shifting back and forth of constant elements. The elements that are now decentralizing are not the same elements that made up the first mass—any more than the tempered steel that emerges from the mill is the same raw materials that charge the blast furnace. The men drawn to this land from backward lands by the promise of fortune and a higher freedom, and the men drawn to the big industrial cities from the backward reaches of our own land by the lure of higher wages and greater leisure, are not in anything but name the same men who are now moving back to the places of their origin. Something vital—it might almost be called a chemistry of character—has occurred to change them. Perhaps the foreigners did not find here the fortunes they fondly expected; perhaps the people from our own hills and countryside are not taking back with them much in the way of savings from their higher wages or much of material profit from their greater leisure—but foreigners and natives alike are returning home with more precious treasure than these: knowledge of city discipline and hygiene and cooperation, of the art of living together in sanitary surroundings, of the value of coordinated effort in civic, industrial and business undertakings. There is no measuring the values a five or ten-year stay in the industrial centers of America have added to the character of the individual as man and citizen—but they are remarkable. The American tourist, in our own or other lands, is constantly remarking them in the American-industry-trained natives he encounters in out-of-the-way places. Almost always these are the men who stand out from their fellows as having more awareness, more initiative, more swift ingenuity in emergency. And of course the civilizing influence of these city-won values is everywhere observable when the native returns, in the gradually but perceptibly rising general level of culture and creature-comfort in the circles that surround him.

Mass Production Brought Changes

It is the same in industry. The elements decentralized are not the same as those originally massed. Without the lessons and disciplines learned in mass production, there could be no decentralization. Decentralization is not the righting of an evil or error inherent in mass production, but the logical outcome of the experience only mass production can provide. By bringing distant parts to a common center we learn to coordinate them—to make them a cooperative whole; by disseminating them when effective coordination has been achieved, we learn further to refine the units. These are not separate movements, but parts of a progressive whole—as natural and beneficial as the rise and fall of the sea.

Though it is much talked about, "industrial decentralization" is a term that still needs some defining, and perhaps the defining can best be done by stating at the outset what it is not.

For one thing, it is not to be confused with the involuntary or the merely restless or self-seeking moving to and fro of business that to some extent is always going on in this country. For one reason or another, not to be ascribed to an urge or desire to "decentralize," some businesses are always on the move. In a

* Paper prepared for the 7th International Management Congress, Washington, D. C., Sept. 19-23, 1938, by W. J. Cameron of the Ford Motor Co.

single year more than 200 left the city of Detroit alone. And Detroit is not unique in this respect. Everywhere it is the same, and the motives for the moving are as various as the businesses: the hostility of a local government infected with some curious social philosophy that confuses the persecution of industry with progress; the danger of confiscation by local tax-assessment; failure to enforce laws designed to protect the legitimate operations of business and industry. Such moving is more than justified—and it is, incidentally, changing the whole aspect of many a community. Less justified is a change of scene to take advantage of lower wage conditions, or for other similar reasons. The mere changing of locality, for whatever reason, good or bad, does not constitute decentralization. Nor does the opening of branches in smaller communities by industrial organizations in great ones constitute decentralization. Rather these are a *re*-centralization, and, so far as the objectives of true decentralization are concerned, of no more significance than the opening of rural branch banks, libraries, post offices and other such excellent and necessary suburban public conveniences.

Not a Branch Movement

Decentralization, as we understand it, is taking away a part or parts of a large organization and setting these separated parts in another place to operate independently. This presupposes a great central organization in the first place and the subsequent separation and removal to other localities of such departments of that central organization as can be so separated and re-located with the foregone assurance of successful operation "on their own." It also presupposes an industry whose major product is an assembly of thousands of parts complete in themselves.

It is where the branch movement ceases that decentralization begins and, though it is with a certain understandable reluctance, this writer is constrained to say that, so far as we know, industrial decentralization cannot at present be notably illustrated outside the practice of the Ford Motor Company.

Henry Ford has been actively and personally concerned with the decentralizing experiment since 1917. And it is a matter that requires *personal* attention, which is perhaps one reason why it is not more widely practiced. He conceived the idea while driving about southeastern Michigan —territory familiar to him since boyhood—and noting the spots along the River Rouge, where the wise pioneers placed their little mills to profit most from its water power. An abandoned grist mill on a bend of the River Rouge, known as Nankin Mills, provided a site for his first experiment. Gradually he acquired many such sites.

Today there are 12 small village Ford hydro-electric plants, employing anywhere from 25 to 400 men, in operation along the Rouge, the Huron, the Raisin and other small southeastern Michigan rivers and streams, with 10 more in progress or prospect. All are within a 50-mile radius of Dearborn, so that stock may be distributed to them and their finished product brought to the Rouge for general assembly by truck without prohibitive haulage cost.

Some of them are reconstructed and reconditioned grist mills, as little changed in their appearance of a century ago as is consistent with sound structure, perfect working conditions and, of course, the new uses to which they are being put. Some are of modern industrial architecture, with all that is new and efficient in heating, air conditioning and the like. All have their picturesque setting of landscaped grounds, quiet millpond and rushing tail-race, and not one brings a clashing industrial note to the quiet harmony of the countryside.

These small hydro-electric plants —each as distinct and necessary a part of the whole Ford Industry as the great foundry (largest in the world) at the Rouge—produce such various things as valves, copper castings, lamps, carburetors, starters, generators, ammeters, twist drills, die engravings, badges, taps, inspection gages and soy bean products. One of them (at Phoenix), save for its superintendent, is operated entirely by women—94 of them—who assemble stop-light switches and cut-outs. Inside and out these plants are not only models of cleanliness, but places of real beauty, a delight to the eye, a marvel to visitors and matters of pride and joy to the men and women who rightly consider themselves fortunate to be at work under the pleasant conditions they provide.

In addition there are Ford hydro-electric plants on the Menominee River at Iron Mountain, Michigan (wood parts); on the Hudson River, at Green Island, N. Y. (radiators, spring assemblies, wheel assemblies, etc.); on the Miami River, at Hamilton, Ohio, (wheels, running boards, etc.); and on the Mississippi, at Twin City, Minnesota, (glass)—but these, with a combined personnel exceeding 6000, are rather too large to be called "village" industries. Strictly speaking, the Ford decentralization therefore embraces 22 little plants, with an approximate total of 4000 employes, which, of course, will be considerably increased as soon as other parts can logically and advantageously be detached from the great central body at the Rouge.

Sentiment Is Insufficient

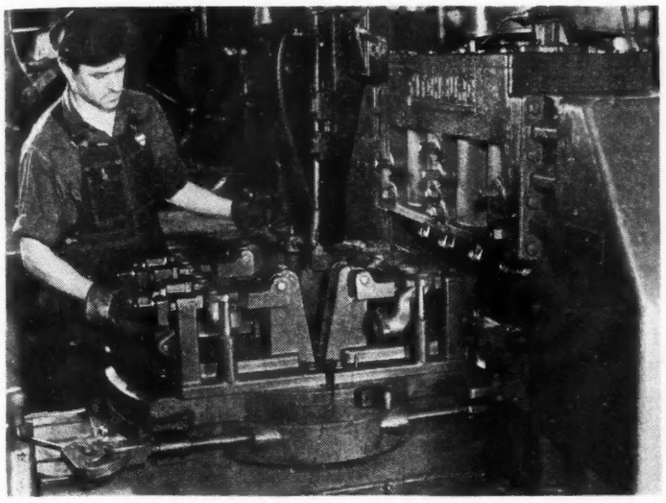
And this is a point to be noted. The undeveloped plants in the Ford decentralization program will not be hurriedly equipped and manned merely to carry out Mr. Ford's often-expressed belief that the country will be better off when its workers have "one foot on the land and one in industry." It is true he wants to provide, as far as it lies within his power to provide, a way by which people can leave the congested industrial districts, live in the country, devote their energies both to industrial work and the cultivating of their fields and enjoy all *the advantages of rural life with a city income.* But the humanitarian motive alone is not enough in practical matters, and if such a program were based solely on sentiment it would inevitably defeat its own ends. Mr. Ford was interested in bettering the lot of the worker, making life easier and more enjoyable for everyone, but in this matter of small industries in the country, he was interested from the practical business man's point of view as well; in water-power development, for instance, and in economical operation. That these practical considerations went hand in hand with the humanitarian; that they worked out to the practical benefit of the Ford Motor Company and the social and economic advantage of its employes—is not a matter for wonder. The practical and workable usually turn out to be the humanly and socially desirable and beneficial.

What are these benefits and advantages to employer and employed?

They are many and definite and there is no one connected with these little industries—be he an executive of the Ford Motor Company or a sweeper in the smallest plant—who is not enthusiastic over the results of the experiment.

From the employe's side: He works in a small factory, in beautiful surroundings and where noise and strain are reduced to the minimum. He lives in the best place on earth to live—an American village, or on

(Turn to page 239, please)



All the faces of the exhaust manifold for all six cylinders of the engine are machined at once by this device, recently installed at the Plymouth factory. Duplicate mountings are on a revolving table, so the cutters can be working on one manifold while the operator unloads and loads another.

Production Lines

Superfinish

Chrysler's development of Superfinish—see details in early issue of AUTOMOTIVE INDUSTRIES—is one of the most marvelous things that has happened in machine shop research in recent years. You can chalk up another master stroke to the credit of Dave Wallace, whose elevation to the presidency of Chrysler Sales Corp. hasn't altered his bent for things mechanical. Superfinish can be applied to any machined surface which has been prepared by any type of metal cutting operation. The resulting surface finish can be produced free of scratches and imperfections down to a level of the millionth of an inch as measured by the Profilometer. Best of all, the cost of Superfinish on important mating parts is too low to worry about. Watch for the complete story in an early issue.

Solution Cycle

Some short time ago we mentioned in this column the development of a solution-cycle refrigeration system for automobiles and buses. Although not yet a commercial reality, the idea has elements of interest for vehicle designers. A closed thermal system, if it works can provide an air-conditioning installation of the lightest weight, greatest compactness, lowest cost. It can function without moving parts and the operating cost should be negligible since it is claimed that engine exhaust will provide the heat balance required. Several companies are working along similar lines and only time will tell whether any of the systems can be produced commercially. Meanwhile we have been literally flooded with inquiries from important engineering sources who have evinced more than idle curiosity concerning this development. Some of the inquiries intimate that in the studied opinion of the writers, the solution cycle will ultimately displace any mechanical refrigeration system for motor vehicle use.

No Lash

One of our friends made the rounds with a new mechanically actuated automatic valve lifter. It's self-contained and independent of the lubricating system. While the device has not been tested in a production engine under operating conditions, many people are said to have been impressed with the principle. At any rate, this device is an interesting thing for any engine designer to contemplate.

Partnership

One of the best names in motor cars has launched a program of engineering for lower cost with better quality. We can't mention the name at this writing. Wish we could because here is the finest example we have ever seen of a production-minded engineering organization and our hat's off to the chief. They have gone over the chassis with a fine tooth comb looking for ways and means of changing design, substituting different materials and different methods of fabrication. When you look over the '39 cars you will be favorably impressed, as were we.

Surface Treatment

Much credit is due Perfect Circle for its development of the Ferrox treatment and the philosophy of engine wear as enunciated by Macy Teetor. We don't have to tell them, but some of our readers may be interested to learn that Ferrox treatment will be used by other manufacturers in surfacing certain hard working parts where wear is a big problem. One of the motor car builders is making a new line of barrel tappets which will be finished in Ferrox. They claim it's so good that they can use it to true up and condition rough-ground cams.

Improves Shackle

Emerging from successful experience in the replacement field, one of the specialty manufacturers is about to launch an interesting spring shackle for automobiles and trucks. Chief feature is the use of tapered pins pressed into hard steel plate to form U. Spring eye is fitted with split bushing having tapered bore corresponding to taper of pins. Advantages, according to producer: ease of assembly and replacement; longer life due to ability to take up wear; improved ride with leaf springs.

Rare Gases

August issue of *Oxy-Acetylene Tips* marks beginning of an interesting series dealing with the valuable properties and uses of the rare gases—argon, neon, helium, krypton, and xenon. Linde "rare" and inert gases are extracted from the atmosphere by the Linde liquid air process.—J. G.

Smokemeter of Simple Design Tests Diesel Combustion

THERE is no more dependable indicator of the quality of combustion in a Diesel engine than the exhaust smoke. A clear exhaust is evidence of clean combustion, while a dark exhaust is proof of imperfect combustion. When the exhaust is smoky, high fuel consumption and troubles from soot deposits can be predicted with practical certainty. However, exhaust observations are usually made with the free eye, which gives inaccurate results during day time and practically none at night. The exhaust smoke can be judged best with a background of blue sky, but even then the quantity of the exhaust, the observation distance, and the personal element prevent a strict comparison of the observations. On cloudy days, or in the absence of the sky background, visual observations are less trustworthy, and at night they are almost of no value.

A very simple smokemeter has been developed and used for over six months in the Diesel Laboratory of the Pennsylvania State College. As shown on Fig. 1, it consists of a tube of 2 in. inside diameter, and 18 in. long, with a glass window at each end, there being a 100-watt projector lamp at one end, an adjustable shutter interposed between lamp and window, and a G.E. pocket-type lightmeter at the other end, of the type generally used for measuring room illumination. One end of the tube is connected through a ⅛-in. (inside diameter) copper pipe to the engine exhaust, the other is open to the atmosphere through a short ⅛-in. nipple. It is advisable to hinge either one or both windows, to facilitate cleaning.

The smoke density is measured in the following way: The tube is scavenged with air, and the lightmeter hand is brought to register 50 foot-candles by adjusting the shutter. Then the smokemeter is connected to the engine exhaust, and when the hand assumes its new equilibrium in about 30 sec., the foot-candle reading is recorded. If the reading is, say, 30 foot-candles, the loss in light intensity is 20/50 = 40 per cent, and the corresponding smoke density is denoted 40. If the instrument registers no loss in light intensity when switching from free air to engine exhaust, then the smoke density is, of course, zero.

Besides its extreme simplicity, which permits building the apparatus for approximately $25, there are other points in its favor. It is a sampling instrument. It acts as if a sample of undiluted exhaust gas were placed in the smokemeter tube under atmospheric pressure. This effect is obtained by connecting the smokemeter in parallel with the exhaust through a small-size pipe and permitting pressure equalization by another small opening to the atmosphere. The results are independent of the light source, intensity, lightmeter sensitivity, deposits on the windows, exhaust-gas velocity and cross-sectional area of the smokemeter tube. The only factor that enters—besides the smoke density—is the length of the tube, which can be conveniently standardized at 18 in. If the windows become obscured during the test, or the light source changes in intensity, etc., the effect is neutralized by so adjusting the shutter that the lightmeter hand registers 50 with free air. If the exhaust smoke causes the hand to go back to x, then the smoke density is 100 $(1 - x/50)$.

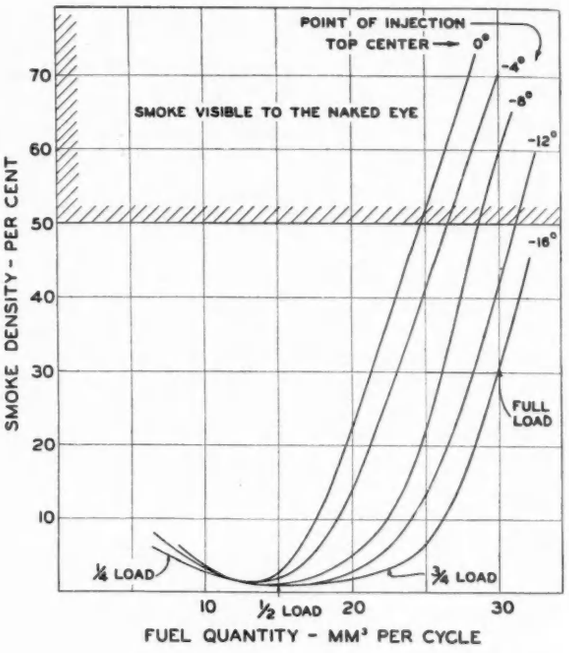


Fig. 2—Change of smoke density with fuel quantity and injection advance angle.

Fig. 2 shows a typical smoke-density record of an engine. It will be noted that between ¼ and ¾ load the smoke density is practically zero. Beyond the ¾-load point the smoke density increases slowly, while beyond the normal full load it increases rapidly. Below ¼ load an appreciable smoke density is noted again which, however, is invisible to the naked eye. Against blue sky background the smoke is just beginning to be clearly visible when the smokemeter registers a smoke density of 50.—P. H. S.

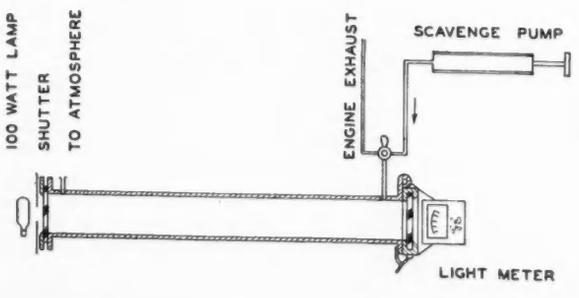


Fig. 1—Simple type of smokemeter used in the Diesel laboratory at Pennsylvania State College.

Twenty Years of Decentralization

(Continued from page 236)

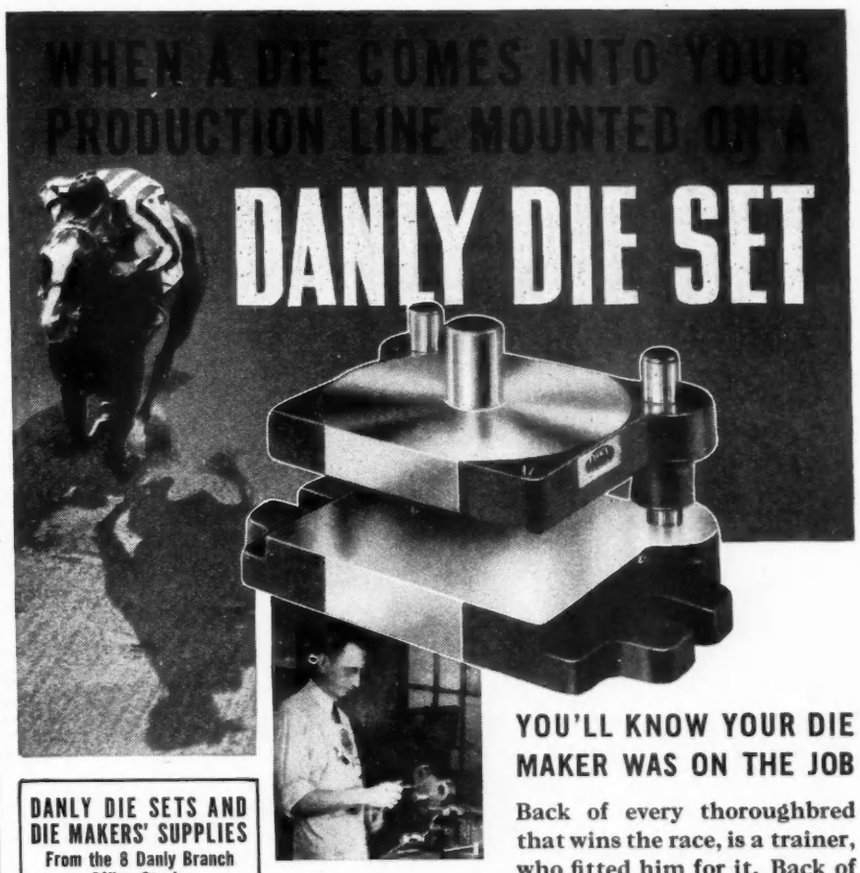
land near that village, and nine times in ten it is his own village, for as a preliminary to establishing one of these new village industries it is the practice to employ men from the neighborhood, train them in their work at the Rouge and move them with the department to its new rural site. His family has the advantage of living in quiet, restful, peaceful surroundings, and in the cleaner air of the country, yet within an hour's ride of the big city. He and his wife and children are assured of living in a "good" neighborhood, something they cannot always be sure of in the city, however much more they pay in rent or for land. He has an opportunity to raise vegetables, or chickens, or cows, or pigs, and thus ease the pull on his income. If he has no land of his own, the thrift gardens of the company always are available. The very nature of his work, as all production men will understand, is assurance of its relative steadiness. Except for brief seasonal lay-offs, or at their own request in the sowing or harvesting time, the employes of the Ford village industries never have been without jobs. Perhaps the best proof of the relative desirability of the country over the city industrial jobs and of the popularity of decentralization with the workers is the army of city employes that is constantly besieging the Company's employment office for transfers to the suburban plants.

From the employer's side the advantages are equally definite. It is our experience that on the whole the quality of the work performed in the village plants is much higher than that done in the larger ones; that a small, self-contained, or even a fairly large but segregated one, as at Ypsilanti, where nearly 900 men and women are turning out generators and starters under conditions and in surroundings as nearly ideal as present knowledge can make them, develops a pride and a skill seemingly impossible where that department is part of a vast central factory combining many close-coupled departments. Because they see it clearly and understand its place in the general industrial scheme, the men have a greater interest in their work. Because they are not part of a restless, constantly shifting population of a great industrial city, there is almost no labor turnover.

The proof of the economy of the experiment is that throughout the village industries minute and money costs are constantly diminishing, though, of course, the practice is followed here, as in every Ford shop, of making the men on the payroll a true cross-section of the community from which they are drawn, in incidence of disability as well as of age, and the standard minimum Ford wage of $6 a day prevails.

Other important factors making both for the happiness and efficiency of the village industrial worker are that he is free from the sometimes too close supervision almost inseparable from a great centralized plant, and management and men are restored to the personal relationship that is lost in large mass production plants.

Summed up, Mr. Ford's experiment in decentralization thus far has proved eminently successful—indeed, one of the most wholly satisfying he ever has undertaken—and



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it will bear investigating (which this company invites and encourages) by those in a position to undertake like experiments.

But though holding great promise for expansion, it still is but a small-scale experiment. It is not yet decentralization in any large sense, and complete industrial decentralization is not now regarded as possible. The heavier and final operations in the manufacture of products such as the automobile must always be centralized. For example, foundries are large units and must remain intact. It is only to the contributory departments that we can look hopefully for any fairly rapid and considerable development of the decentralization idea. Here, however, the opportunities are many. If the industry be large enough and management have sufficient reason and good will (for, as stated at the outset, it involves considerable personal attention by management, already heavily burdened) it is only a matter of studying what departments or what operations can be separated from the mass and advantageously "set up in housekeeping" on their own in a happier location—but not too far removed for the parent body to keep a paternal eye on its offspring. Our experience has been that the paternal eye is rewarded by a vision of considerable accomplishment achieved by the mere fact of removal and separate supervision.

Beyond the immediate benefits and advantages accruing to the employer and the employed from industrial decentralization, there are the wider implications of its communal and national social and economic significance. In more than one instance during depression years the establishing of a little Ford industry in a Michigan town has been the economic salvation of that town. At the same time this action has the effect of relieving, however slightly, the human congestion of one of our overcrowded industrial centers—a good thing in itself, for these congested areas too often are the breeding ground of social unrest and disease that no amount of technical progress can overcome.

DIRECTION

FOR THOSE "AT SEA"

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Japan Promotes Cellulose

FOLLOWING the example of Germany, where all cotton yarns of certain weight have been made with an addition of artificial fibers since 1936, the Japanese Minister of the Interior issued a decree which went into effect on Feb. 1 of the current year, according to which all fabrics made of natural staple fiber must contain an addition of at least 30 per cent of cellulose fiber. The decree, moreover, stipulated that all cotton fabrics in stock which were fabricated previous to the coming into the effect of the new decree, should be exported as far as possible. It is reported from Japan that that country in 1937 manufactured 232,000 tons of synthetic wool of cellulose base, and thereby became the world's leading producer of artificial fibers.

Chilton Roundtable

(Continued from page 226)

is the big job of the independent repair shop operator. . . . Vitally important is the correct way to describe it, for the rendering of service that is really prompt and really effective is the kind of stuff on which the business lives and grows.

There is a mutually profitable opportunity for closer and more effective teamwork between the independent repair shop operator and the jobber, but all the advantages to be derived will materialize only when both independent and jobber realize that they are actually partners who should pull together.